“EFFECT OF CAWTHORNE-COOKSEY EXERCISES ALONG WITH BREATHING AND PROPRIOCEPTION EXERCISES ON BALANCE, DISABILITY AND POSTURAL CONTROL IN VERTIGO PATIENTS”.

A DISSERTATION SUBMITTED TO THE TAMILNADU

Dr. M.G.R MEDICALUNIVERSITY, CHENNAI,

AS PARTIAL FULFILLMENT OF THE

MASTER OF PHYSIOTHERAPY DEGREE

APRIL 2012.

CERTIFICATE

Certified that this is the bonafide work of **Ms.R.NITHYA DEVI** of K.G. College of Physiotherapy, Coimbatore submitted in partial fulfillment of the requirements for the Master of Physiotherapy Degree course from the Tamil Nadu Dr.M.G.R. Medical University under the **Registration No: 27102210** for the April 2012 Examination.

Date: Principal

A Dissertation on

"EFFECT OF CAWTHORNE-COOKSEY EXERCISES ALONG WITH BREATHING AND PROPRIOCEPTION EXERCISES ON BALANCE, DISABILITY AND POSTURAL CONTROL IN VERTIGO PATIENTS".

has been submitted in partial fulfilment for the requirement of the Master of Physiotherapy degree,

April 2012.

Internal Examiner **External Examiner**

“EFFECT OF CAWTHORNE-COOKSEY EXERCISES ALONG WITH BREATHING AND PROPRIOCEPTION EXERCISES ON BALANCE, DISABILITY AND POSTURAL CONTROL IN VERTIGO PATIENTS”.

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I. INTRODUCTION

Vertigo is a rotational, spinning component and is the perception of movement either of the self or surrounding objects that is not occurring or is occurring differently from how it is perceived. Dizziness, vertigo and disequilibrium are symptoms that can result from : Peripheral vestibular disorder (85%) - a dysfunction of the balance organs of the inner ear or Central vestibular disorder (15%) - a dysfunction of one or more parts of the central nervous system that help process balance and spatial information (Kroenke et al).

Vertigo accounts for over 7.5 million medial visits each year .The incidence of vertigo is estimated at 64 per 1, 00,000 population and distribution between male and female are approximately equal. In epidemiological studies, research in primary care settings reports a higher percentage of non – vestibular vertigo: 88% of the cases to be chronic and 44% of cases visit physician's ≤ 15 times (Sloane and Dallara, 1999). Almost 4% of people report on chronic problem with balance while an additional 1.1% people report on chronic problem with dizziness alone. Vertigo is a multisensory syndrome of various origins and pathological features, the attempt to treat vertigo with a single – target, is limited and no specific approach has been absolutely effective.

Vestibular rehabilitation is a comprehensive method of assessing and treating symptoms of vestibular pathology. It deals with management of vertiginous

patients by alleviating the symptoms and increasing the threshold to vertigo. Rehabilitation includes several activities to treat vertigo, balance problem, functional limitation and disabilities caused by impairment of the vestibular system dysfunction.

The goal of this therapy is to retrain the brain to recognise and process signals from vestibular system in co-ordination with vision and proprioception. Rehabilitation can be performed using the Cawthorne – Cooksey exercises supplemented by training of the breathing rhythm and proprioception exercises in vertigo patients based on self reported balance, disability and postural control. There are evidence suggest that regulation of breathing pattern have an influence on balance, disability and proprioception exercises improve postural control related to chronic vestibular diseases.

Thus this study was conducted to find out the supplementary effects of breathing and Proprioception exercises along with Cawthorne and Cooksey exercises on balance, disability and postural control in chronic vertigo patients.

1.1. NEED FOR THE STUDY

Vestibular rehabilitation exercises are expected to improve central compensation through habituation, central sensory substitution and rebalancing at vestibular nuclei. Exercises included for rehabilitation mainly focus on head, body movements, co-ordination of eyes with the head and balance tasks. The results of several previous studies examined the efficacy of vestibular exercise program for patients with vertigo to improve balance skills, reduce avoidance behaviour or reduce anxiety. There are no studies on the supplementary effect of breathing and proprioception exercises along with vestibular rehabilitation on balance, disability and postural control in vertigo patients. Thus this study was conducted to know the supplementary effects of proprioceptive and breathing exercises in vertigo population.

1.2. AIM OF THE STUDY

A study to assess the effect of Cawthorne – Cooksey exercises along with breathing and proprioception exercises on balance, disability and postural control in vertigo patients.

1.3. KEYWORDS

Vestibular Rehabilitation, Berg Balance Scale, Dizziness Handicap Inventory and Clinical test of sensory integration

1.4. OBJECTIVES OF THE STUDY

- To know the effect of Cawthorne – Cooksey exercise on balance, disability and postural control in vertigo patients
- To know the supplementary effect of Breathing exercises along with Cawthorne – Cooksey exercises on balance, disability and postural control in vertigo patients
- To know the difference between the supplementary effect of breathing and proprioception exercises along with Cawthorne –Cooksey exercises and Cawthorne – Cooksey exercises alone on balance, disability and postural control in vertigo patients

1.5. HYPOTHESES

1.5.1 NULL HYPOTHESES

H□1: There is no significant improvement on balance, disability and postural control following cawthorne -cooksey exercise alone in vertigo patients.

H□2: There is no significant improvement on balance, disability and posturalcontrol following cawthorne-cooksey exercise along with breathing exercises in vertigo patients.

H□3: There is no significant improvement on balance, disability and postural control following cawthorne-cooksey exercises along with proprioception and breathing exercises in vertigo patients.

1.5.2. ALTERNATE HYPOTHESIS

Hα1: There is significant improvement on balance, disability and postural control following cawthorne-cooksey exercise alone in vertigo patients.

Hα2: There is significant improvement on balance, disability and postural control following cawthorne-cooksey exercise along with breathing exercises in vertigo patients.

Hα3: There is significant improvement on balance, disability and postural control following cawthorne-cooksey exercises along with breathing and proprioception exercises in vertigo patients.

II. REVIEW OF LITERATURE

REVIEWS ON VESTIBULAR REHABILITATION

Lucyyardley et al., (2009)

Studied on vestibular rehabilitation for dizziness and vertigo in primary care patients to promote neurological adaptation skill and confidence in balance. Symptoms, disability and quality of life are assessed by validated questionnaires in post-treatment and one year follow up. This study indicates that patients can cost effectively manage their dizziness in primary care.

Rachel L Humphries et al., (2000)

Studied on the clinical outcomes of vestibular rehabilitation on 60 patients. Pre-treatment and post treatment scores assessed using dizziness handicap inventory in which 80%of patients showed an improvement. The study concluded that outcome of vestibular rehabilitation was found to be beneficial for any peripheral vestibular system lesion.

Noore and Deweert (1980)

Studied on “positional provoked vertigo treated by postural training vestibular habituation training”. They selected patients who described as provoked vertigo or vertigo elicited during movement. These patients were instructed to repetitively perform manoeuvres that elicited vertigo. 91% of their

cases reported some improvement whereas 64% reported more than 75% reduction in symptoms of vertigo.

REVIEW ON PREVALENCE OF VERTIGO

Min Yin Kazuo Ishikawa et al., (2007)

They gave "A clinical epidemiological study in 2169 patients with vertigo". It was retrospective study on 2169 patient with vertigo. There are more than 50 kinds of causative diseases were recognised. Peripheral and central vertigo took up 33.8, 17.2 and unclassified type is of 26.8%of patients. Vertigo patients increased according to age but no significant difference in incidence rate between genders. In 650 cases compared to younger patients the elderly have a high tendency of suffering vertigo

REVIEWS ON CAWTHORNE-COOKSEY EXERCISES

Stefano Corna, Antonio Nar done et al., (2003)

Studied "comparison of cawthorne-cooksey exercises and sinusoidal translations to improve balance in patient with unilateral vestibular deficit". 32 patients with complete or incomplete unilateral vestibular lesion were included. They used cawthorne-coooksey exercises and instrumental exercises as intervention twice daily for 30 minutes per session for 5 days. The results showed both interventions improved patients balance. The study concluded both

cawthorne-cooksey exercises and instrumental rehabilitation are effective for treating balance disorders of vestibular origin.

Hackers et al., (1974)

Studied the "Results of cawthorne – Cooksey exercises in vertigo patients". The study included the patients believed to have vertigo from vascular insufficiency and those with other types of vertigo. They found 84% of these patients treated with such exercises showed improvement.

REVIEWS ON DIZZINESS HANDICAP INVENTORY

Diane M Wrisley et al., (2005)

Studied on "Efficacy of vestibular rehabilitation using dizziness handicap inventory scores in 37 patients retrospectively. Patients with peripheral lesions showed greater improvement compared with central or mixed types. A significant improvement in scores indicated at the 0.05 level after vestibular rehabilitation exercises.

M.T.Hudax Susan L.Whitney (1999)

Studied "The comparison of Activities specific balance confidence scale to assess the person confidence level and Dizziness handicap inventory used for patients complaining of dizziness". 71 subjects with age group from 26 to 88 years selected. Both dizziness handicap inventory and activities balance

confidence scale were administered. The results suggest both are valid tool to use for dizziness people.

G.P Jacobson (1990)

Studied on "Dizziness handicap inventory to assess the impact of dizziness on quality of life". A cross-sectional design was used to examine factor structure, concurrent validity, internal consistency, discriminate ability. Longitudinal design was used to examine test re-test reliability and smallest detectable difference and responsiveness. The Dizziness handicap inventory demonstrated satisfactory measurement properties. Dizziness handicap inventory is used in clinical work and research to assess the impact of dizziness on quality of life.

REVIEWS ON BERG BALANCE SCALE

Whitney et al., (2009)

Studied on "short term effects of vestibular rehabilitation on symptom, disability, balance and postural stability in chronic vestibular dysfunction". Group 1 were treated with customized exercise program for 4 weeks, Group 2 did not receive any treatment. Pre and post treatment assessment done with respect to symptoms (visual analogue scale), disability (dizziness handicap inventory) balance (berg balance scale), and postural stability (sensory interaction).Significant improvements in all parameters were obtained in group 1

whereas group2 showed no improvement. The study concluded significant improvement seen in symptom, disability, balance, postural stability in chronic vestibular dysfunction after an exercises program.

Karen W .Hayes et al., (2003)

Studied on the "Validity of Berg balance scale in people with vestibular disorders". The purpose of the study to measure balance impairment in adults through a performance based test. Validity was established in a 3-phase process utilizing 38 patients and 32 health care professionals .Validity has been supported by moderate to high correlations with other clinical performance measures. The study concluded that Berg balance scale is a commonly used performance based scale for examining functional balance skills for clinical and research purposes.

Malhotra et al., (2002)

The study shows the relationship of dizziness handicap inventory and its component with Berg balance scale in vertigo patients. It was retrospective study having co-relational design.56 patients with chronic dizziness selected. Berg balance scale and Dizziness handicap inventory were used as questionnaires for all subjects. Data was analysed using Pearson's co-relation coefficient between both inventories. Outcome measures of both Berg balance scale and Dizziness handicap inventory individually provide valuable information about functional,

physical, emotional and body function and structures; activities and participation , environmental and personal factors whereas Berg balance scale measures the balance and postural control.

REVIEWS ON MODIFIED CLINICAL TEST OF SENSORY INTEGRATION

Joseley et al., (2011)

Determine the Clinical test of sensory integration in balance score on therapist observation was compared with force plate measures to find concurrent validity. The concurrent validity for the Clinical test of sensory integration in balance was calculated using Pearson's correlation coefficient. The study concluded that Clinical test of sensory integration in balance is a valid test for balance evaluations.

Cohen H. Blatchly (1993)

Studied the clinical test of sensory integration on balance which provides information about the ability to stand upright under several conditions. Three groups of neurologically asymptomatic adults and fourth group comprised subjects diagnosed with vestibular disorders were compared across groups under six different conditions. Asymptomatic and vestibular impaired subjects had greater variation in their scores. This test is a useful screening tool for examining postural control of balance.

REVIEWS ON PROPRICEPTION AND BREATHING EXERCISE

Kelly P Westlake (2007)

Studied on "short term enhanced sensory specific balance training on proprioceptive re-integration on 36 participants. 17 randomly assigned to balance exercise group and 19 to falls prevention education group. Results measured using activities specific balance confidence scale. The study showed improvement in postural control following proprioception exercises.

M.E.Clark et al., (2010)

Studied on "Effects of paced respiration on anxiety reduction in36 patient with high anxiety score". They were randomly assigned to pacing or control group. Paced subjects received slow-breathing training for 10 minutes and control group simply counted paced tones. Prior to session, self -ratings noted on anxiety, tension level. The study concluded that respiratory pacing is an easily learned self- control strategy and can be used as therapeutic tool.

B.J.Yates (2002)

Studied on "Role of the vestibular system in regulating respiratory muscle activity during movement". The change in posture affects the length of diaphragm which may diminish airway potency which is corrected by firing of upper airway muscles. The regions of cerebellum which receive vestibular inputs also influence respiratory muscle activity. This study showed the role of

vestibular system in the control of respiration to provide rapid adjustment in oxygen demand during movement and exercises.

REVIEWS ON BALANCE AND POSTURAL CONTROL

Krebs et al., (2001)

Studied on "Efficacy of vestibular exercises on postural stability during functional activities in chronic vestibular deficits". The exercise program consists of both balance and gait training and combinations of head and eye movements. The exercises shown to produce more rapid recovery in rehabilitation group of patient than the control group of patients.

Horak et al., (1994)

Studied on "The direct role of vestibular apparatus on postural corrections". The study shows that patient with chronic vestibular deficits had improved postural stability after 6 week course of vestibular rehabilitation exercises program compared with the group of patients performing general conditioning exercises. The exercises were customized for each patient and included balance and gait exercises as well as exercise incorporating combinations of head and eye movements. There was significant improvement in disability, balance and postural control in patient with chronic vestibular deficits after rehabilitation programme.

III. METHODOLOGY

3.1. STUDY DESIGN

Three group pre-test and post-test experimental study design.

3.2. STUDY SETTING

The study was conducted in physiotherapy outpatient department, K.G. Hospital, Coimbatore.

3.3. STUDY SAMPLING

Based on selection criteria, 30 vertigo patients were selected and they were allotted into 3 groups by simple random sampling method as 10 patients in each group.

3.4. STUDY DURATION

The study was conducted for a period of 1 year.

3.5. CRITERIA FOR SELECTION

3.5.1 INCLUSION CRITERIA

- Age group between 40 and 60 years
- Both sexes were included in this study
- Chronic peripheral vestibular disease (presence of symptoms at least for 6 months)
- Patients with difficulty in activity of daily living, due to symptoms related to vestibular disease like instability- when walking on uneven surfaces, changing posture, frequent falls, and dizziness
- Patients who have abnormal caloric test
- Unilateral vestibular hypo function
- Patients diagnosed as vertigo
- Vertigo patients who are willing to participate in the study

3.5.2. EXCLUSION CRITERIA

Patients with,

- Meniere`s disease
- Benign paroxysmal positional vertigo
- Severe sensory loss
- Psychiatric illness

- Cardiovascular conditions, respiratory and orthopaedic diseases
- Any other neurological disorders
- Visual impairments and hearing deficits
- Uncontrolled diabetes mellitus
- Uncontrolled hypertension and postural hypotension
- Severe cognitive and perceptual deficits

3.6. VARIABLES

3.6.1. Independent Variables

- Cawthorne-cooksey exercises
- Cawthorne-cooksey exercises with breathing exercises
- Cawthorne-cooksey exercises with breathing and proprioception exercises

3.6.2. Dependent Variables

- Functional Balance
- Disability
- Postural control

3.7. OUTCOME MEASURES

- Berg balance scale
- Dizziness handicap inventory
- Modified clinical test of sensory integration test

3.8. PARAMETERS

- Balance
- Disability
- Postural Control

3.9. ORIENTATION OF SUBJECTS

Before treatment, all subjects were explained about the study and procedure to be applied and were asked to inform if they feel any discomfort during the course of the treatment. All the patients who were interested to participate in the study were asked to sign the consent form before the treatment.

3.10. PROCEDURE

Based on the selection criteria 30 vertigo patients are selected. They were assigned into 3 groups by simple random sampling method, as 10 patients in each group. All 30 subjects were involved for pre-test assessment for functional balance, disability and postural control.

- Group A subjects received only cawthorne – Cooksey exercises
- Group B subjects received breathing exercises along with cawthorne – Cooksey exercises
- Group C subjects received breathing exercises and proprioception exercises along with cawthorne – Cooksey exercises.

After 8 weeks of treatment, subjects from all 3 groups were involved for the post test assessment. The 8 week treatment program was given as 5 days per week, two sessions per day and 60 to 90 minutes per session.

3.11. STATISTICAL TOOL USED

In this study, one way ANOVA and student 't' test were used to analyse the data.

Analysis of variance (ANOVA):

Analysis of variance is a statistical technique specially designed to test whether the means of more than two quantitative populations are equal .The ANOVA is used to test for differences among the means of the populations by examining the amount of variations within each of these samples, relative to the amount of variation between the samples.

Formula:

$$F = \frac{S_1^2}{S_2^2}$$

$$S_1^2 = \frac{\Sigma(X_1 - \bar{X}_1)^2}{n_1 - 1}$$

Where, S_1^2 is

S_2^2 is $\quad S_2^2 = \frac{\Sigma(X_2 - \bar{X}_2)^2}{n_2 - 1}$

Formula: Paired t-test

$$S = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}}$$

$$t = \frac{\overline{d}\sqrt{n}}{s}$$

Where,

d = difference between the pre-test Vs post-test

$\overline{d}$ = mean difference

n = total number of subjects

s = standard deviation

Formula: Unpaired t-test

$$S = \sqrt{\frac{\sum\left(X_1 - \overline{X_2}\right)^2 + \sum\left(X_2 - \overline{X_2}\right)^2}{n_1 + n_2 - 2}}$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{S}\sqrt{\frac{n_1 n_2}{n_1 + n_2}}$$

Where,

$\overline{x_1}$ = Mean of Group A

$\overline{x_2}$ = Mean of Group B

$\sum$ = sum of the value

n_1 = number of subjects in Group A

n_1 = number of subjects in Group B

S = standard deviation

IV. DATA ANALYSIS AND INTERPRETATION

TABLE – I

I.USING ONE WAY ANOVA

1. Analysis of Pre test Values of Group A, B and C (Berg Balance Scale)

Source of variation	Sum of squares	D.F	Mean squares	F calculated	F Critical
Between groups	6.067	2	3.033	0.478	3.354131
Within groups	171.3	27	6.344		
Total	177.366	29			

While comparing pre-test values of Group A, B and C , the one – way ANOVA results showed that the calculated F- value (0.4781) is lesser than F-critical value (3.3541) and also the p value (0.6251) is greater than 0.05.

Thus there is no significance difference in the pre-test scores of 3 groups in Functional Balance score

TABLE –II

2. Analysis of Post test Values of Group A, B and C (Berg Balance Scale)

Source of variation	Sum of squares	D.F	Mean squares	F calculated	F critical
Between groups	274.2	2	137.1	13.8484	3.3541
Within groups	267.3	27	9.9		
Total	541.5	29			

While comparing post- test values of Group A,B and C the one-way ANOVA results showed that calculated F-value (13.8484) is greater than F critical value (3.3541) and also the p value (0.00007) is lesser than 0.05.

Thus there is significant difference in the post-test scores of 3 groups in Functional Balance score.

TABLE -III

II.USING INDEPENDENT "t" TEST

1. Analysis of Post test Means of Group A and B (Berg Balance Scale)

S.No	Berg Balance Scale	Mean	Mean Difference	Standard Deviation	Calculated 't' Value	Table Value
1	Group A	39.4	2.1	0.74	1.8118	1.734
2	Group B	41.5				

While comparing functional balance scores of Group A and B in Berg Balance scale, the one-tailed't' test analysis showed that calculated 't' value (1.8118) is greater than table value (1.7340) which shows that there is significant difference between these two groups.

GRAPH -I

A. Graph on Analysis of Post Test Means of Group A and B (BBS)

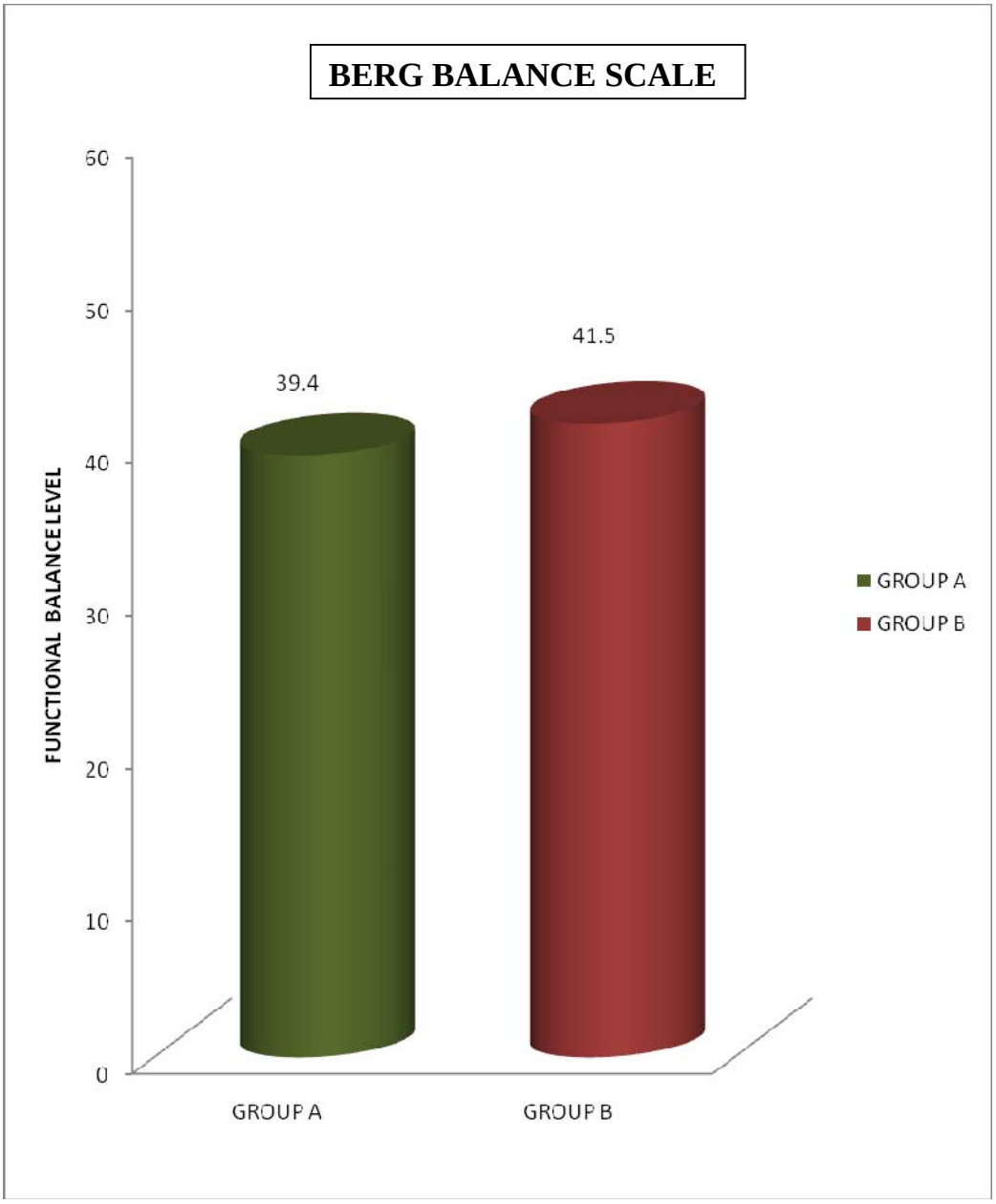


TABLE - IV

2. Analysis of Post test Means of Group B and C (Berg Balance Scale)

S.No	Berg Balance Scale	Mean	Mean Difference	Standard Deviation	Calculated 't'value	Table Value
1	Group B	41.5	5.1	0.88	3.2851	1.7458
2	Group C	46.6				

While comparing functional balance scores of Group B and C in Berg Balance scale, the one –tailed't' test analysis showed that calculated 't'value (3.2851) is greater than table value (1.7458) which shows that there is significant difference between these two groups.

GRAPH – II

B. Graph on Analysis of Post Test Values of Group B and C (BBS)

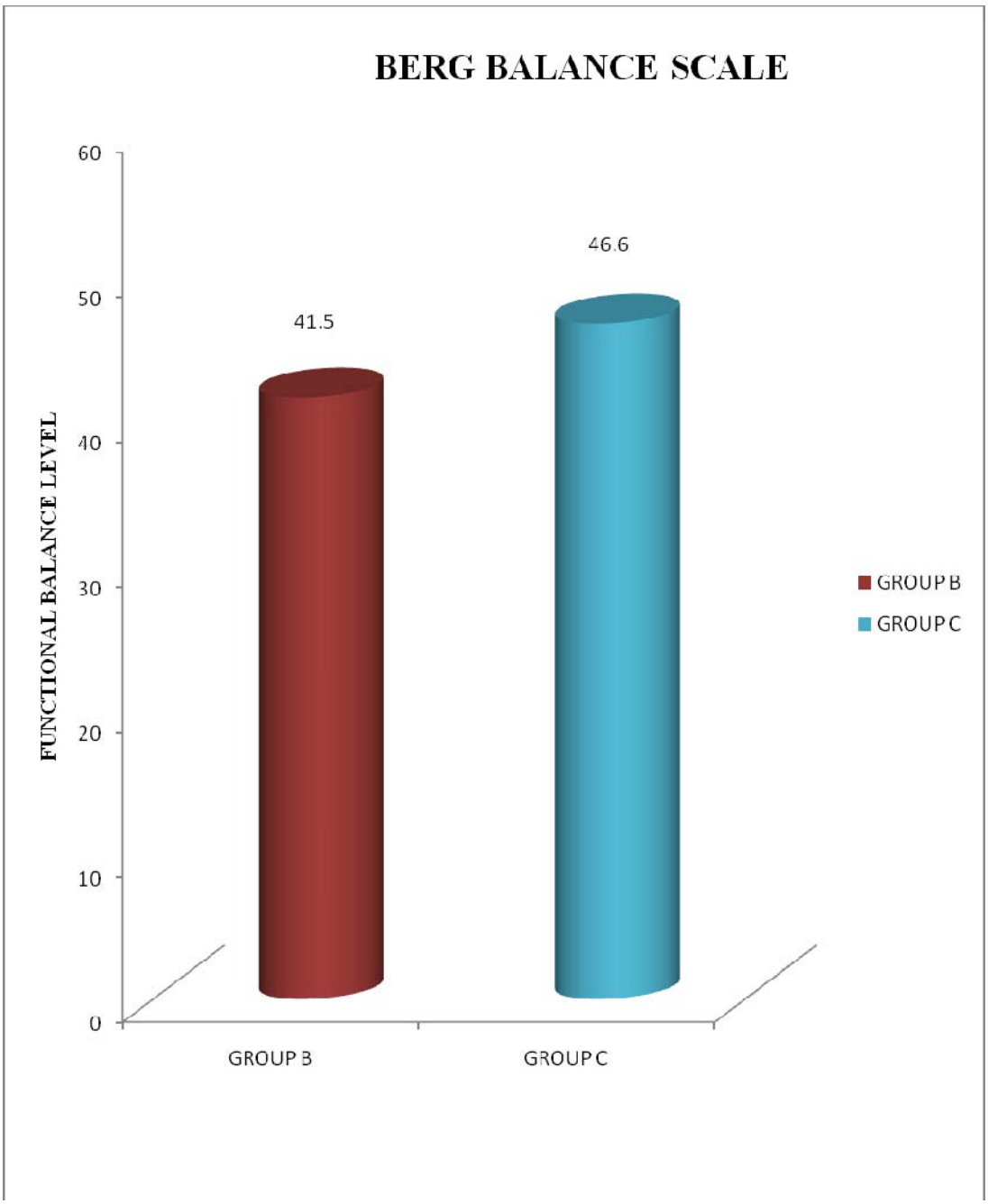


TABLE - V

3. Analysis of Post test Means of Group A and C (Berg Balance Scale)

S.No	Berg Balance Scale	Mean	Mean Difference	Standard Deviation	Calculated 't' Value	Table Value
1	Group A	39.4	7.2	0.74	4.8690	1.7530
2	Group C	46.6				

While comparing functional balance scores of Group A and C in Berg Balance scale, the one tailed 't'test analysis showed that the calculated't' value (4.8690) is greater than table value (1.7530) which shows that there is significant difference between these two groups.

GRAPH -III

C. Graph on Analysis of Post Test Value of Group A and C (BBS)

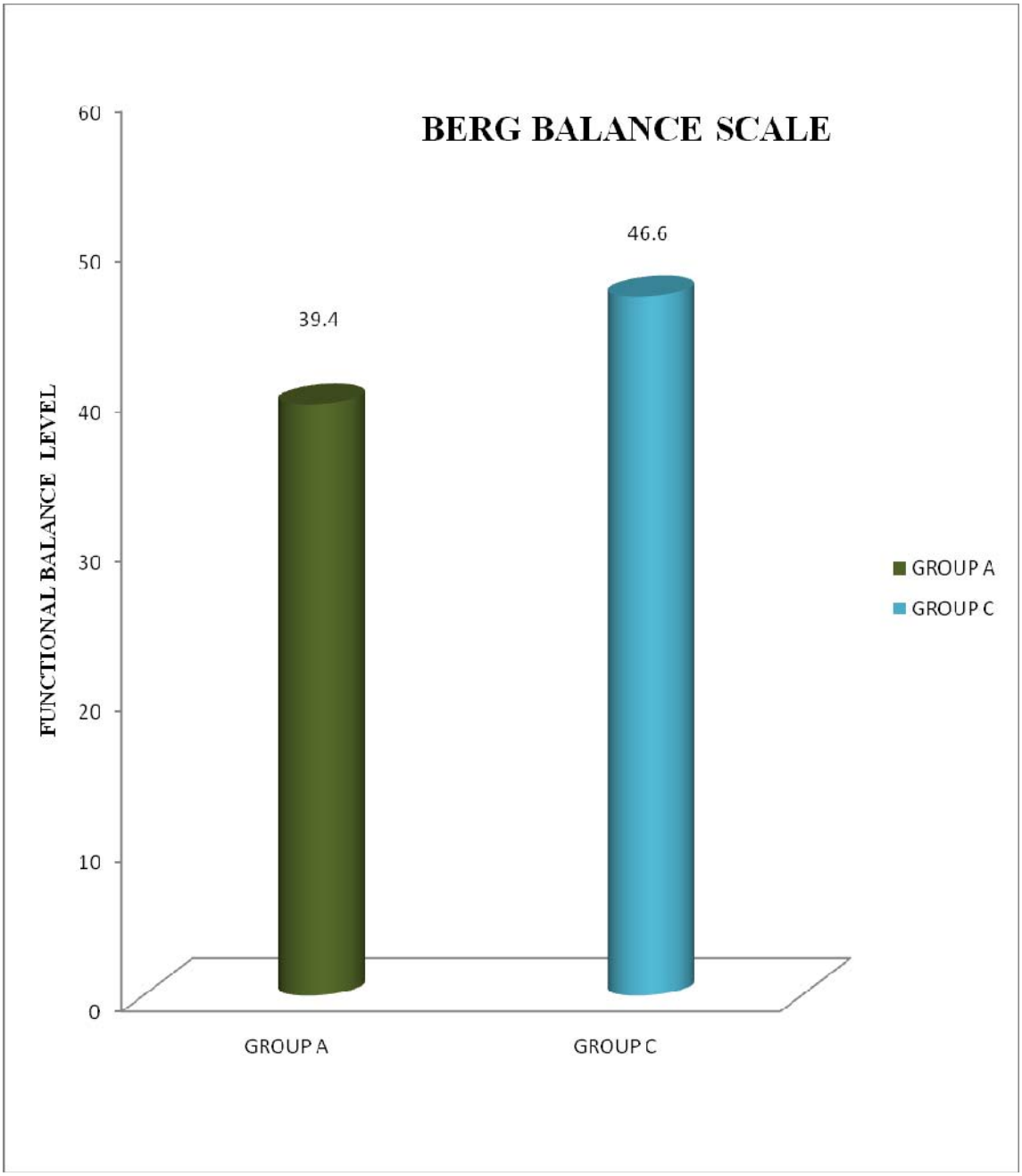


TABLE-VI

III.USING DEPENDENT‘t’ TEST

1. Analysis of Pre-Test and Post-Test Mean of Group A (Berg Balance Scale)

S.No	Berg Balance Scale	Mean	Mean Difference	Standard Deviation	Calculated ‘t’value	Table Value
1	Pre- test	28	11.4	2.63	13.7	1.833
2	Post -test	39.4				

The comparison of pre-test and post-test values of Group A showed that the calculated ‘t ’value is 13.7 is significantly greater than tabulated ‘t’value (1.833).This shows that there is significant improvement after the therapy.

TABLE-VII

2. Analysis of Pre-Test and Post-Test Mean of Group B (Berg Balance Scale)

S.No	Berg Balance Scale	Mean	Mean Difference	Standard Deviation	Calculated 't'value	Table Value
1	Pre-Test	29.1	12.4	2.63	14.9	1.833
2	Post-Test	41.5				

The comparison of pre-test and post-test values of Group B showed that the calculated 't 'value is 14.9 is significantly greater than tabulated 't' value (1.833).This shows that there is significant improvement after the treatment.

TABLE-VIII

3. Analysis of Pre-Test and Post-Test Mean Of Group C (Berg Balance Scale)

S.No	Berg Balance Scale	Mean	Mean Difference	Standard Deviation	Calculated 't'value	Table Value
1	Pre-Test	28.6	18	4.29	13.3	1.833
2	Post-Test	46.6				

The comparison of pre-test and post-test values of Group C showed that the calculated 't 'value is 13.3 is significantly greater than tabulated 't' value (1.833).This shows that there is significant improvement after the treatment.

GRAPH-IV

Graph on Analysis of Pre-test and Post-test Means of Group A, B and C (BBS)

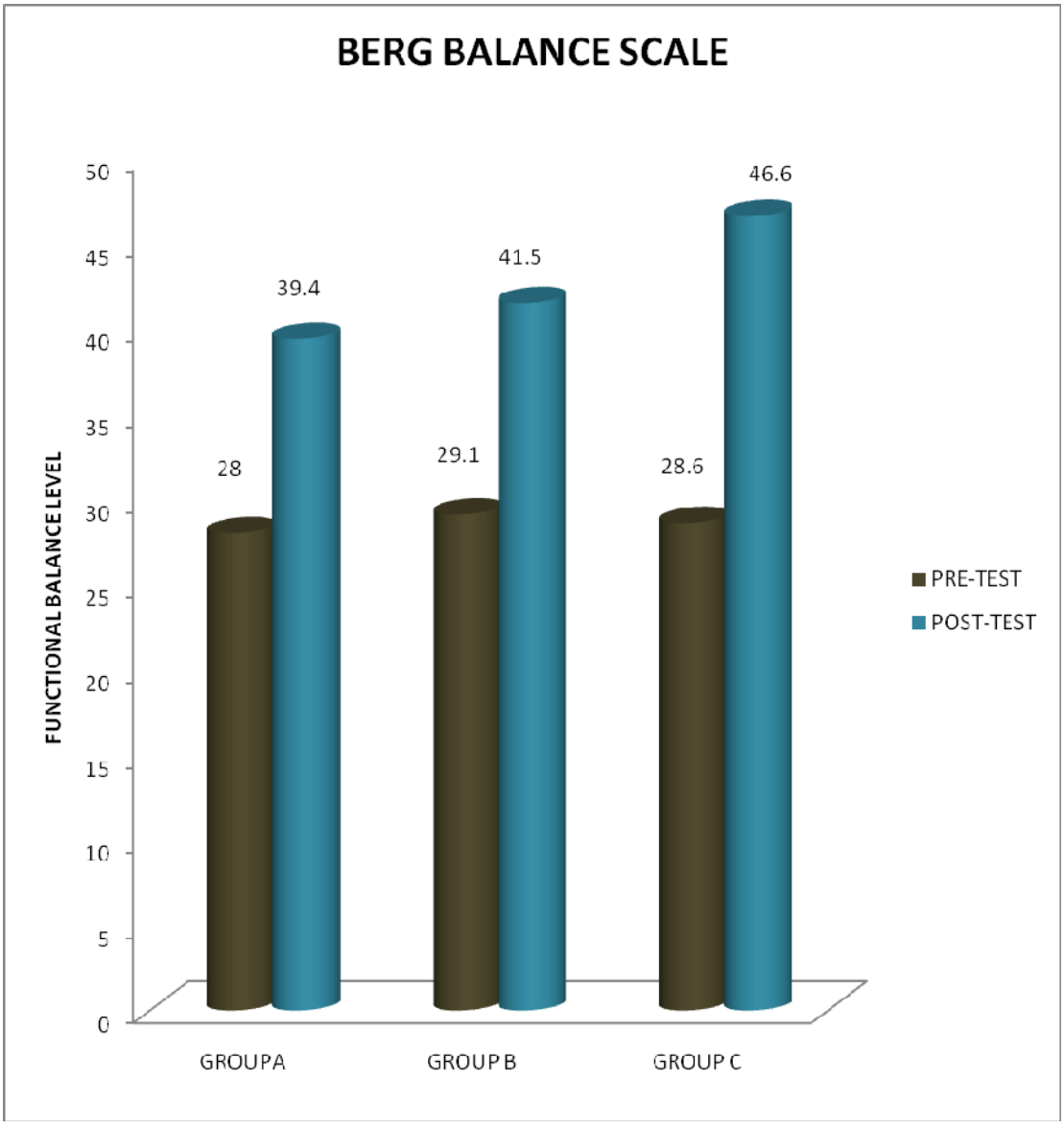


TABLE -IX

I.USING ONE-WAY ANOVA

1. Analysis of Pre-Test Values of Group A, B and C (Dizziness Handicap Inventory)

Source of variation	Sum of squares	D.F	Mean squares	F calculated	F critical
Between groups	16.8	2	8.4	1.5460	3.3541
Within groups	146.7	27	5.433		
Total	163.5	29			

While comparing pre-test values of Group A, B and C the one-way ANOVA results showed that the calculated F-value (1.5460) is lesser than the F-critical value (3.3541) and also the p-value (0.2313) is greater than 0.05.

Thus there is no significance difference in the pre-test scores of 3 groups in Dizziness Handicap Inventory.

TABLE -X

2. Analysis of Post-Test Values of Group A, B and C (Dizziness Handicap Inventory)

Source of variation	Sum of squares	D.F	Mean squares	F calculated	F critical
Between groups	500.6	2	250.3	29.6798	3.3541
Within groups	227.7	27	8.4333		
Total	728.3	29			

While comparing post-test values of Group A, B and C the one-way ANOVA results showed that calculated F-value (29.6798) is greater than F-critical value (3.3541) and also the p value (0.00) is lesser than 0.05.

Thus there is significance difference in the post-test scores of 3 groups in Dizziness Handicap Inventory.

TABLE – XI

II.USING INDEPENDENT 't' TEST

1. Analysis of Post- Test Values of Group A and B (Dizziness Handicap Inventory)

S.No	DHI	Mean	Mean Difference	Standard Deviation	Calculated 't' Value	Table Value
1	Group A	39.4	5.3	0.90	4.171	1.7340
2	Group B	34.1				

While comparing Dizziness Handicap Inventory scores of Group A and B the one-tailed 't'test analysis showed that calculated 't' value (4.171) is greater than table value (1.7340) which shows that there is significant difference between these two groups.

GRAPH -V

A. Graph on Analysis of Post Test Values of Group A and B (DHI)

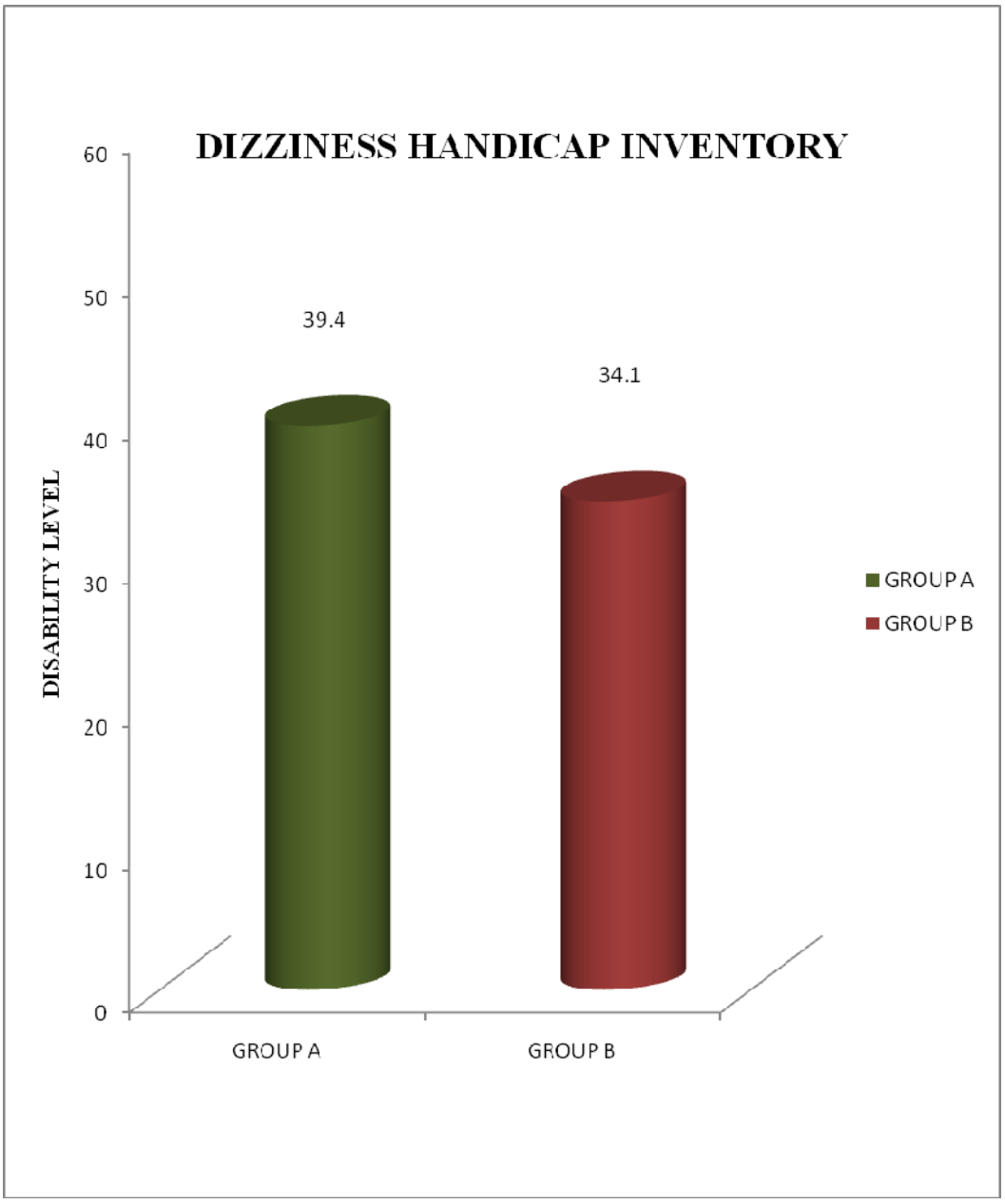


TABLE - XII

2. Analysis of Post Test Values of Group B and C (Dizziness Handicap Inventory)

S.No	DHI	Mean	Mean Difference	Standard Deviation	Calculated 't' Value	Table Value
1	Group B	34.1	4.7	0.88	3.6012	1.7340
2	Group C	29.4				

While comparing Dizziness Handicap Inventory scores of Group B and C, the one tailed 't'test analysis showed that calculated 't'value (3.6012) is greater than table value (1.7340) which shows that there is significant difference between the two groups.

GRAPH -VI

B. Graph on Analysis of Post Test Values of Group B and C (DHI)

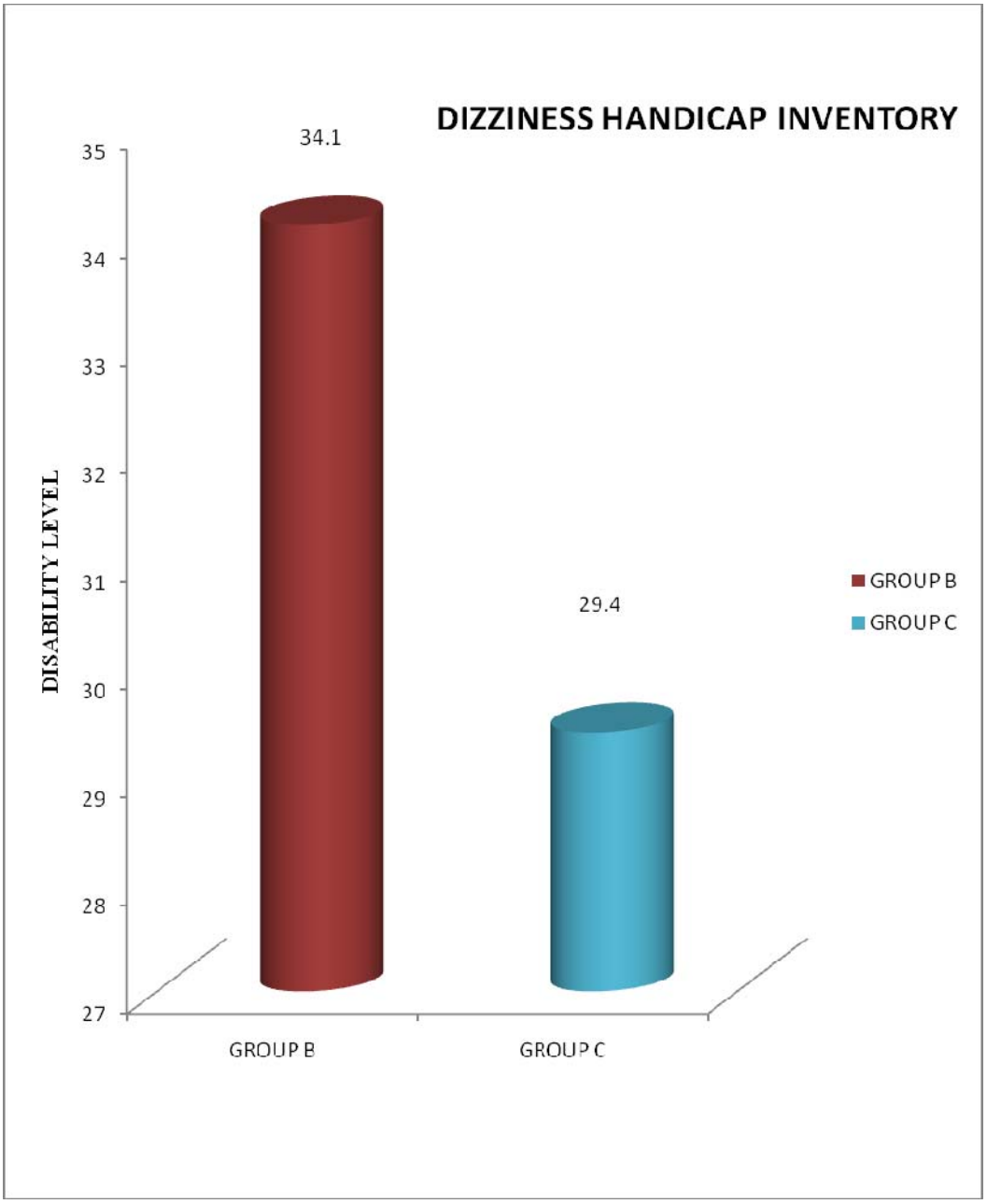


TABLE - XIII

3. Analysis of Post Test Values of Group A and C (Dizziness Handicap Inventory)

S.No	DHI	Mean	Mean Difference	Standard Deviation	Calculated 't' Value	Table Value
1	Group A	39.4	10	0.90	7.5761	1.7340
2	Group C	29.4				

While comparing Dizziness Handicap Inventory scores of Group A and C, the one-tailed't' test analysis showed that the calculated 't' value (7.5761) is greater than table value (1.7340) which shows that there is significant difference between these two groups.

GRAPH -VII

C. Graph on Analysis of Post Test Values of Group A and C (DHI)

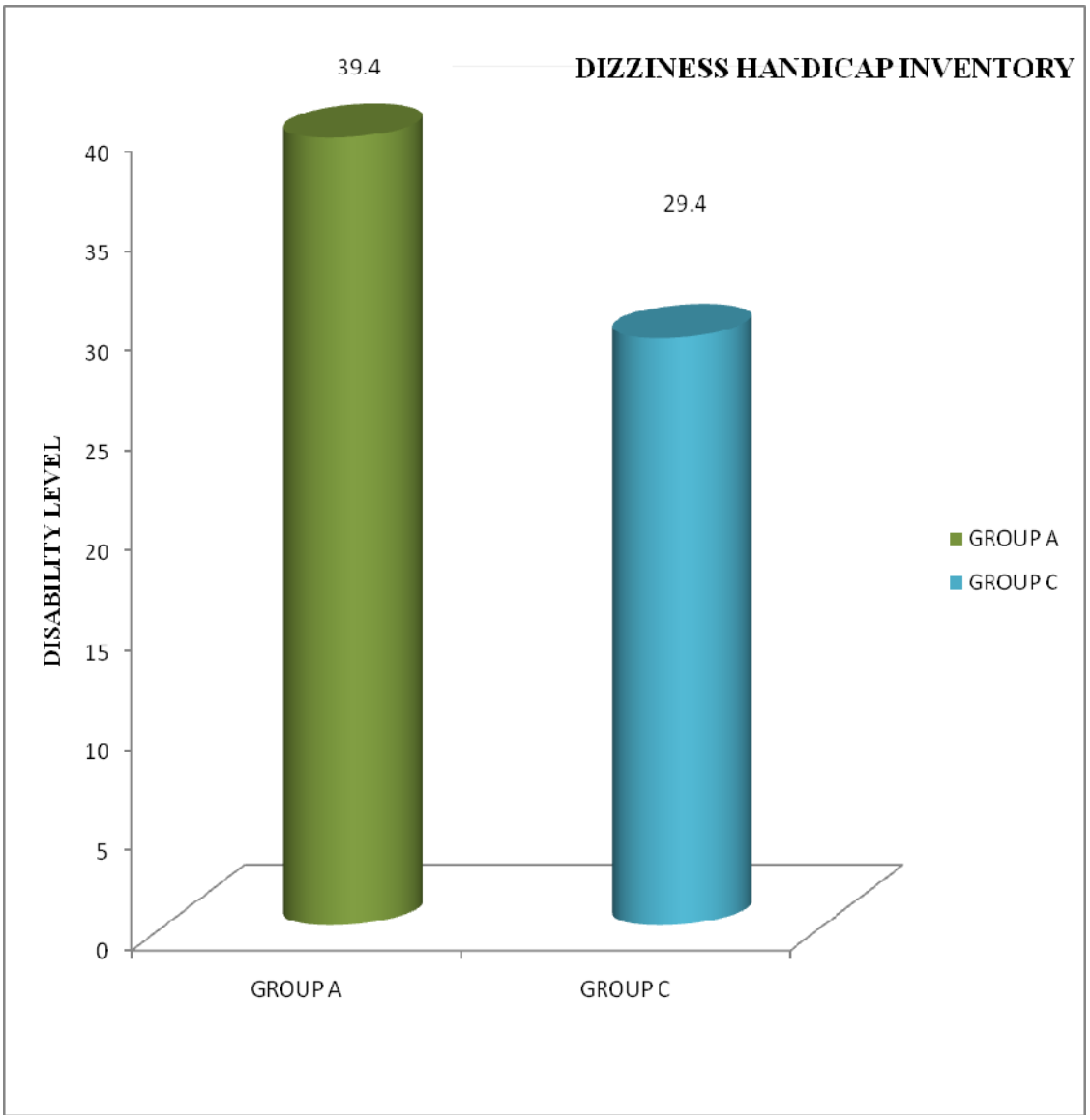


TABLE-XIV

III. USING DEPENDENT‘t’ TEST

1. Analysis of Pre-Test and Post-Test Mean of Group A (Dizziness Handicap Inventory)

S.No	DHI	Mean	Mean Difference	Standard Deviation	Calculated ‘t’value	Table Value
1	PreTest	49.3	9.9	3.35	9.35	1.833
2	PostTest	39.4				

The comparison of pre-test and post-test values of Group A showed that the calculated ‘t ’value 9.35 is significantly greater than tabulated ‘t’ value (1.833).This shows that there is significant improvement after the therapy.

TABLE-XV

2. Analysis of Pre-Test and Post-Test Mean of Group B (Dizziness Handicap Inventory)

S.No	DHI	Mean	Mean Difference	Standard Deviation	Calculated 't'value	Table Value
1	Pre-Test	48.7	14.6	3.63	12.7	1.833
2	PostTest	34.1				

The comparison of pre-test and post-test values of Group B showed that the calculated 't 'value is 12.7 is significantly greater than tabulated 't' value (1.833).This shows that there is significant improvement after the treatment.

TABLE-XVI

3. Analysis of Pre-Test and Post-Test Mean of Group C (Dizziness Handicap Inventory)

S.No	DHI	Mean	Mean Difference	Standard Deviation	Calculated 't'value	Table Value
1	PreTest	47.5	18.1	4.93	11.6	1.833
2	PostTest	29.4				

The comparison of pre-test and post-test values of Group C showed that the calculated 't 'value is 11.6 is significantly greater than tabulated 't' value (1.833).This shows that there is significant improvement after the treatment.

GRAPH -VIII

Graph on Analysis of Pre Test and Post Test Values of Group A, B, & C (DHI)

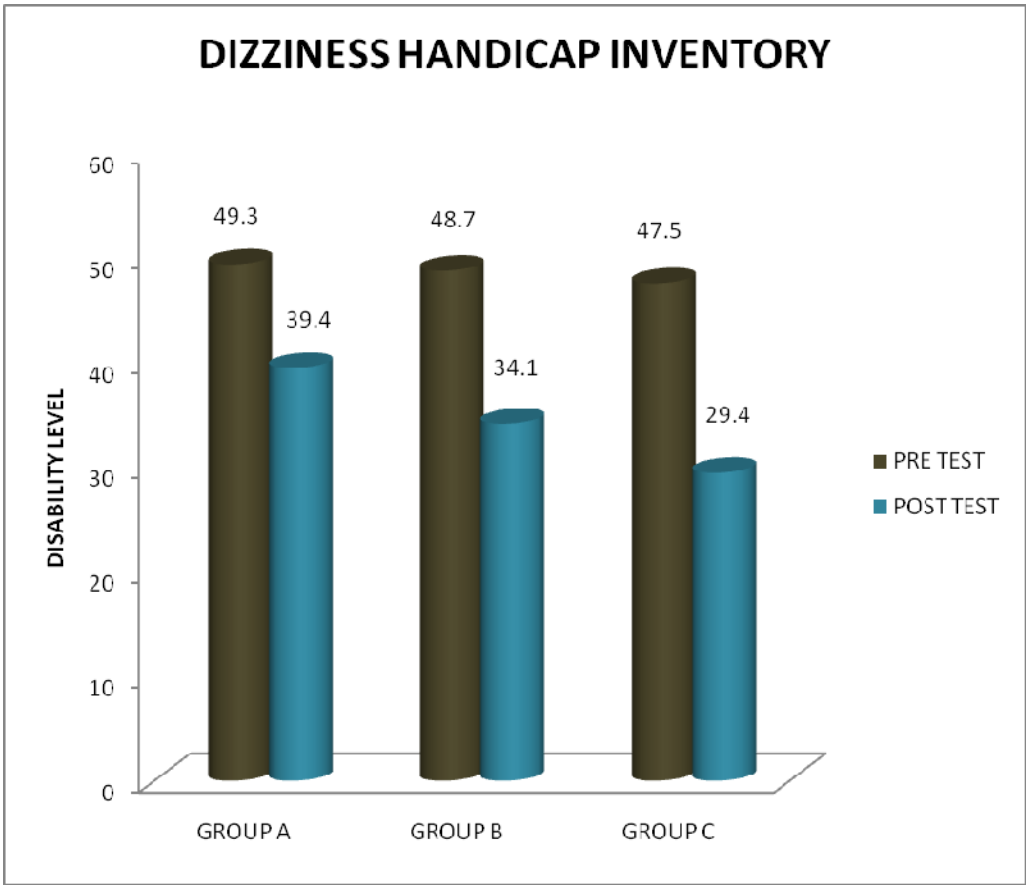


TABLE-XVII

I.USING ONE-WAY ANOVA

1. Analysis of Pre-Test values of Group A, B and C (Clinical Test of Sensory Integration)

Source of variation	Sum of squares	D.F	Mean squares	F calculated	F critical
Between groups	0.00624	2	0.00312	2.0543	3.3541
Within groups	0.04105	27	0.00152		
Total	0.04729	29			

While comparing pre-test values of Group A, B and C the one-way ANOVA results showed that the calculated F-value (2.0543) is lesser than the F-critical value (3.3541) and also the p-value (0.1477) is greater than 0.05.

Thus there is no significance difference in the pre-test scores of three groups in clinical test of sensory integration.

TABLE-XVIII

2. Analysis of Post-Test Values of Group A, B and C (Clinical Test of Sensory Integration)

Source of variation	Sum of squares	D.F	Mean squares	F calculated	F critical
Between groups	0.0769	2	0.0384	21.5268	3.3541
Within groups	0.04823	27	0.00178		
Total	0.1251	29			

While comparing post-test values of Group A, B and C, the one-way ANOVA results showed that calculated F-value (21.5268) is greater than F-critical value (3.3541) and also the p-value (0.00) is lesser than 0.05.

Thus there is significance difference in the post-test scores of three groups in clinical test of sensory integration.

TABLE - XIX

II. USING INDEPENDENT't' TEST

1. Analysis of Post Test Values of Group A and B (Clinical Test of Sensory Integration)

S.No	CTSI	Mean	Mean Difference	Standard Deviation	Calculated 't' Value	Table Value
1	Group A	0.705	0.064	0.01	3.1590	1.745
2	Group B	0.769				

While comparing the clinical test of sensory integration balance scores of Group A and B, the one-tailed't' test analysis showed that the calculated 't' value (3.1590) is greater than the table value (1.7458) which shows that there is significant difference between these two groups.

GRAPH -IX

A. Graph on Analysis of Post Test Values of Group A and B (CTSI)

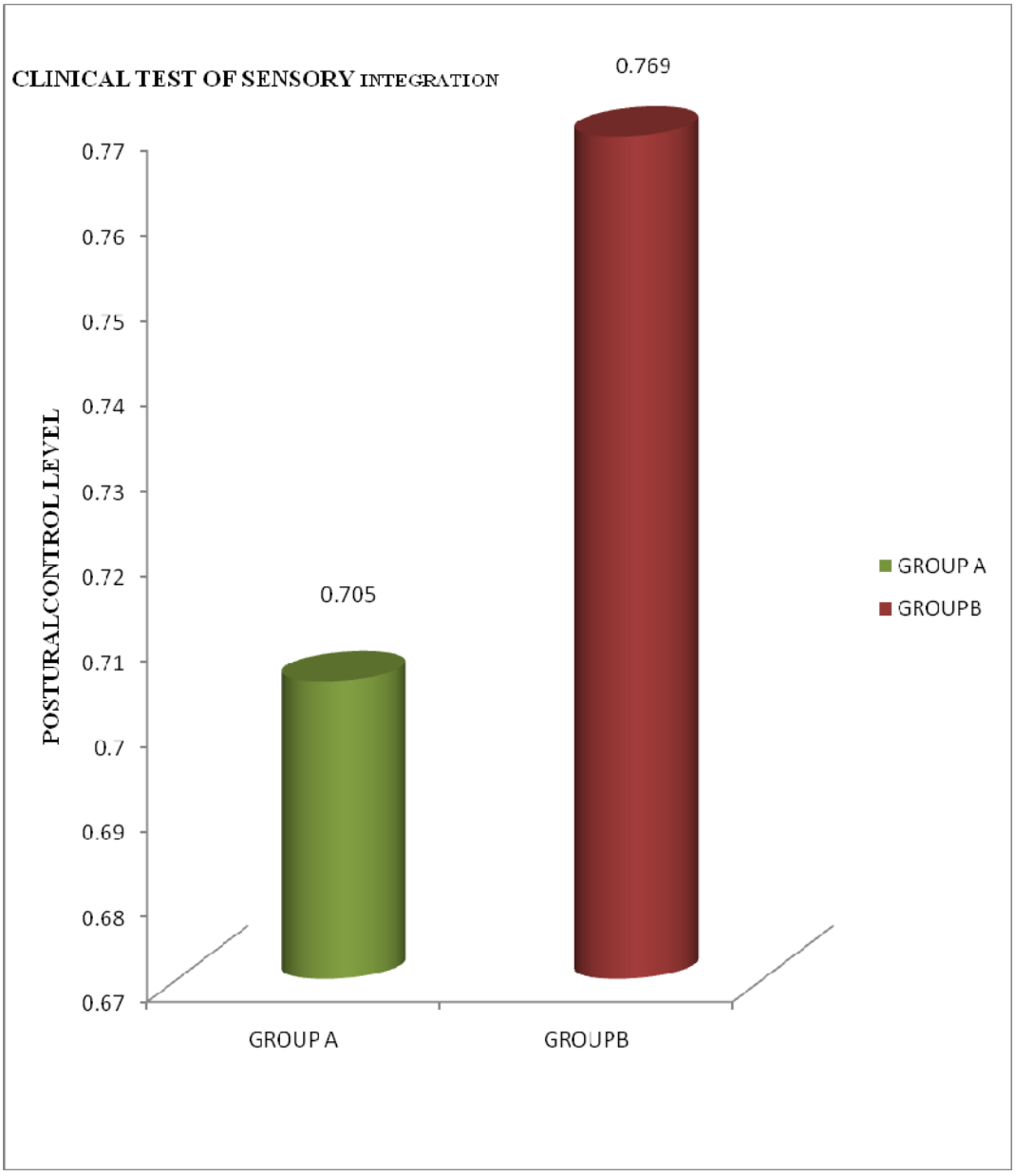


TABLE -XX

2. Analysis of Post Test Values of Group B and C (Clinical Test of Sensory Integration)

S.No	CTSI	Mean	Mean Difference	Standard Deviation	Calculated 't' Value	Table Value
1	Group B	0.769	0.06	0.01	3.7713	1.7340
2	Group C	0.829				

While comparing the clinical test of sensory integration balance scores of Group B and C, the one-tailed 't' test analysis showed that calculated value 't' (3.7713) is greater than the table value (1.7340) which shows that there is significant difference between these two groups.

GRAPH-X

B.Graph on Analysis of Post Test Values of Group B and C (CTSI)

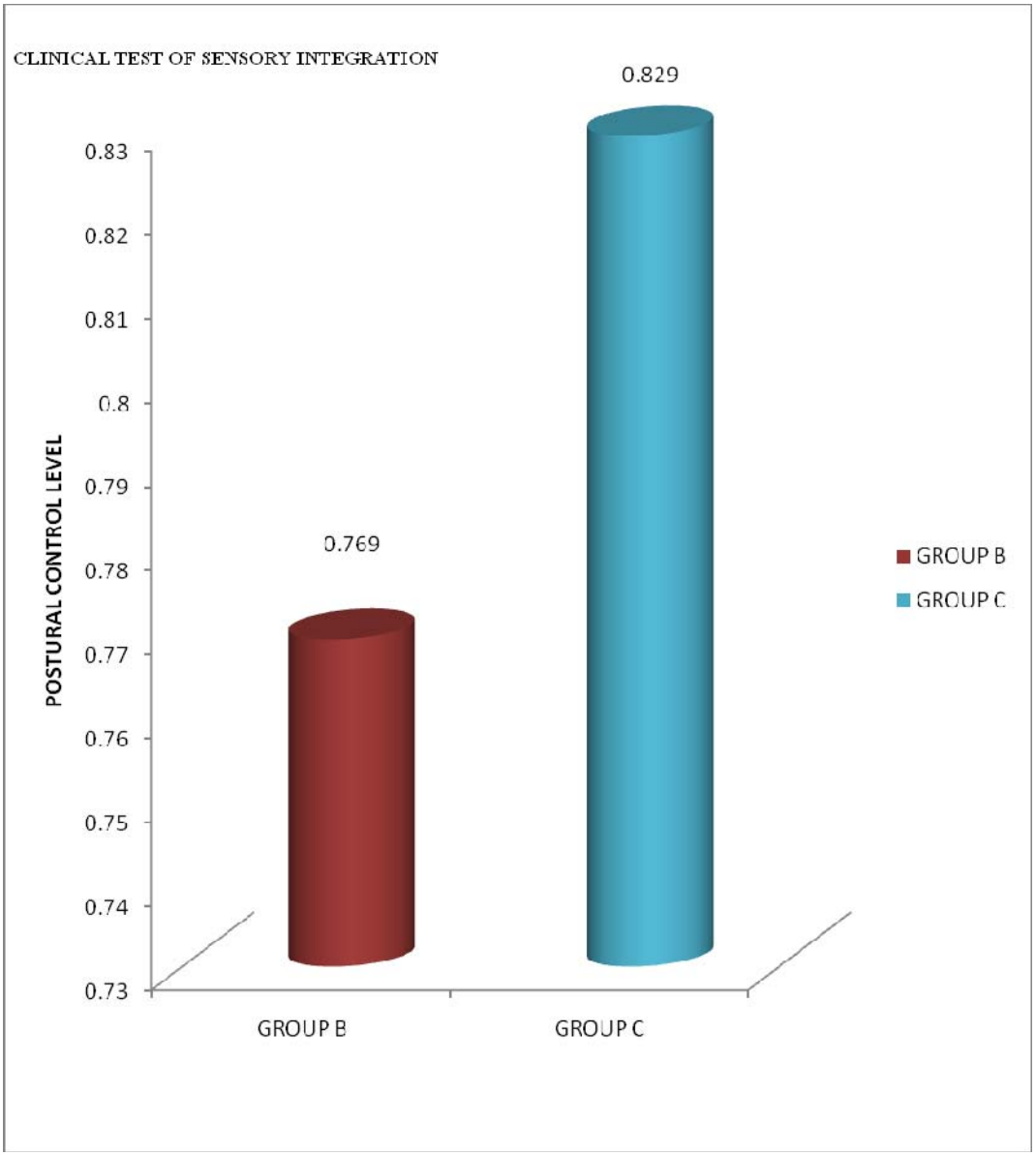


TABLE - XXI

3. Analysis of Post Test Values of Group A and C (Clinical Test of Sensory Integration)

S.No	CTSI	Mean	Mean Difference	Standard Deviation	Calculated 't' Value	Table Value
1	Group A	0.705	0.124	0.01	6.1372	1.7458
2	Group C	0.829				

While comparing the clinical test of sensory integration scores of Group A and C, the one –tailed't' test analysis showed that calculated 't' value (6.1372) is greater than table value (1.7458) which shows that there is significant difference between these two groups.

GRAPH -XI

C. Graph on Analysis of Post Test Values of Group A and C (CTSI)

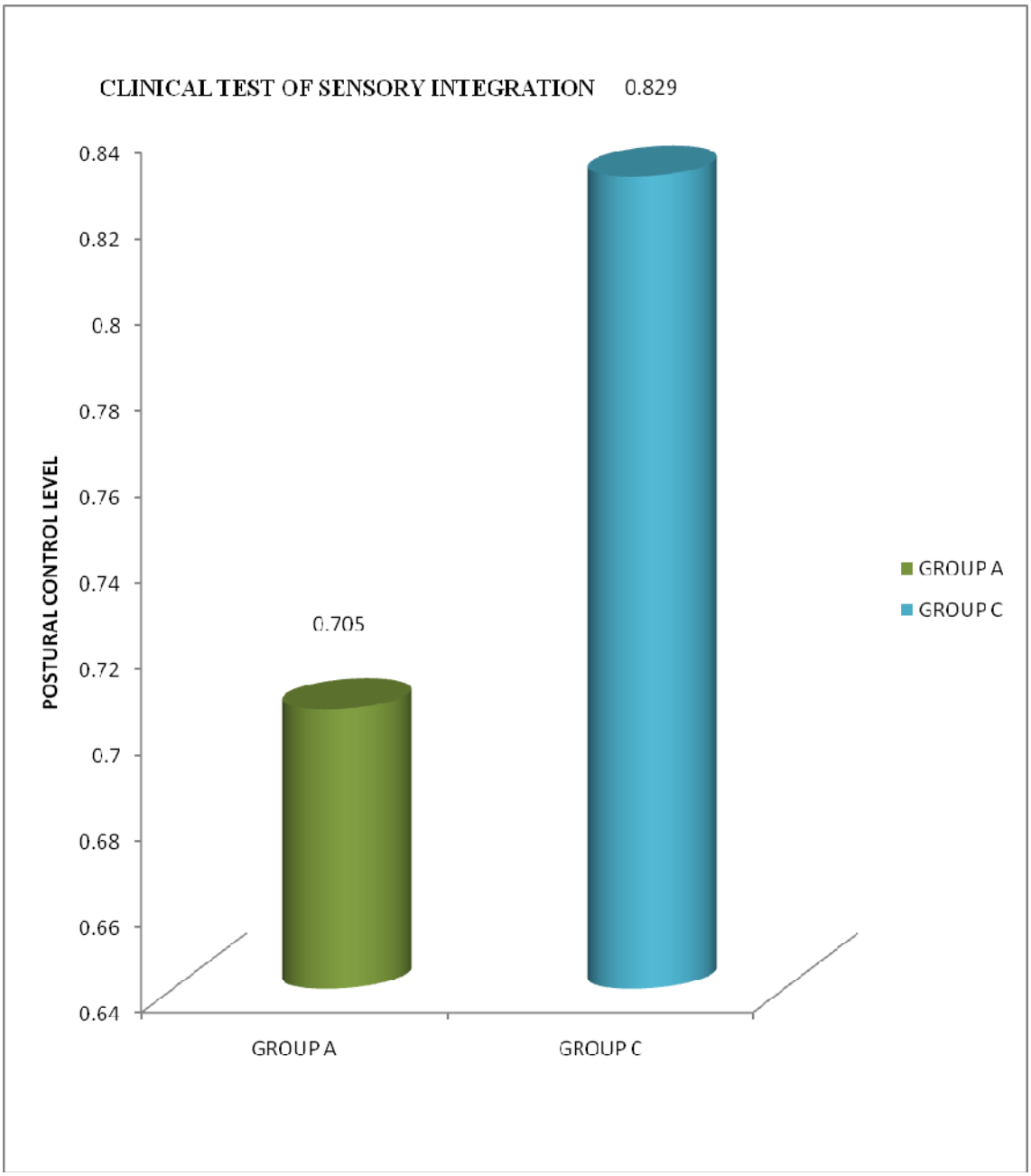


TABLE-XXII

III.USING DEPENDENT‘t’ TEST

1. Analysis of Pre-Test and Post-Test Mean of Group A (Clinical Test of Sensory Integration)

S.No	CTSI	Mean	Mean Difference	Standard Deviation	Calculated ‘t’value	Table Value
1	Pre-Test	0.552	0.153	5.355	9.03	1.833
2	Post-Test	0.705				

The comparison of pre-test and post-test values of Group A showed that the calculated ‘t ’value 9.03 is significantly greater than tabulated ‘t’ value (1.833).This shows that there is significant improvement after the therapy.

TABLE-XXIII

2. Analysis of Pre-Test and Post-Test Mean of Group B (Clinical Test of Sensory Integration)

S.No	CTSI	Mean	Mean Difference	Standard Deviation	Calculated 't'value	Table Value
1	Pre-Test	0.555	0.214	5.502	12.3	1.833
2	Post-Test	0.769				

The comparison of pre-test and post-test values of Group B showed that the calculated 't 'value is 12.3 is significantly greater than tabulated 't' value(1.833).This shows that there is significant improvement after the treatment.

TABLE-XXIV

3. Analysis of Pre-Test and Post-Test Mean of Group C (Clinical Test of Sensory Integration)

S.No	CTSI	Mean	Mean Difference	Standard Deviation	Calculated 't'value	Table Value
1	Pre-Test	0.584	0.245	3.308	23.4	1.833
2	Post-Test	0.829				

The comparison of pre-test and post-test values of Group C showed that the calculated 't 'value is 23.4 is significantly greater than tabulated 't' value(1.833).This shows that there is significant improvement after the treatment.

GRAPH –XII

Graph on Analysis of Pre Test and Post Test Values of Group A, B, & C (CTSI)

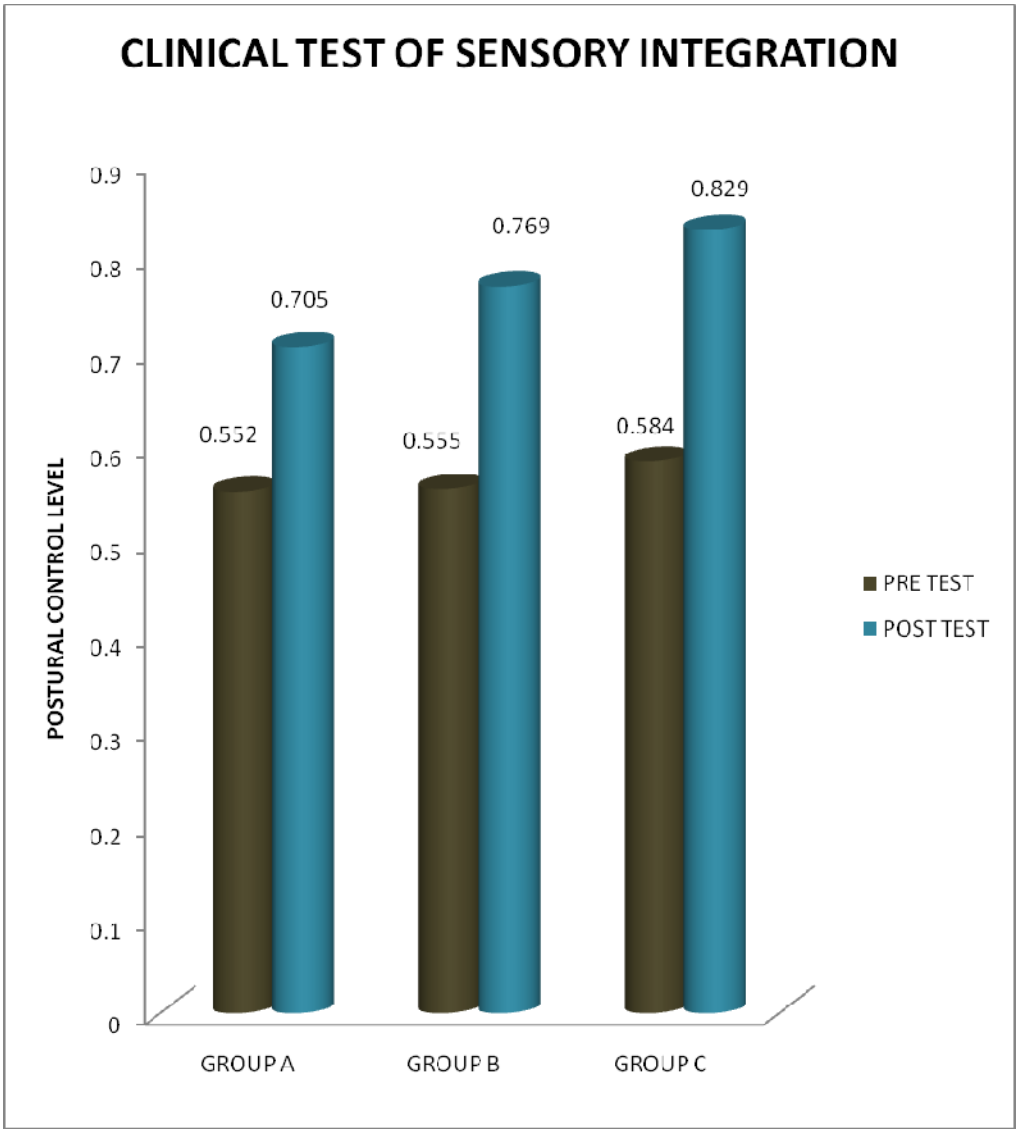


TABLE-XXV

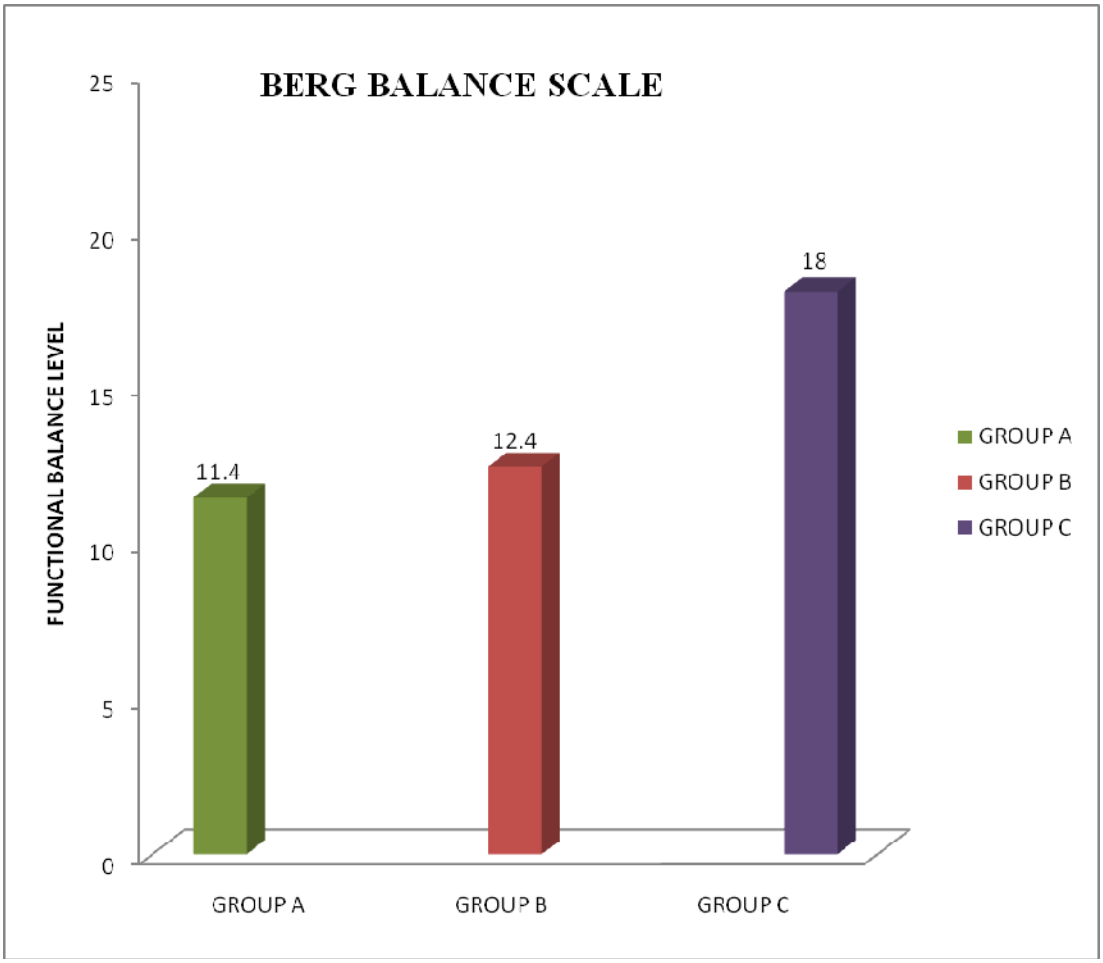
Analysis of Mean Difference Scores of Group A, B and C in Berg Balance Scale, Dizziness Handicap Inventory and Clinical Test of Sensory Integration

Scales	Group- A			Group- B			Group-C		
	Pre	Post	MD	Pre	Post	MD	Pre	Post	MD
BBS	28.0	39.4	11.4	29.1	41.5	12.4	28.6	46.6	18.0
DHI	49.3	39.4	9.9	48.7	34.1	14.6	47.5	29.4	18.1
CTSI	0.552	0.705	0.153	0.555	0.769	0.214	0.584	0.829	0.245

While comparing the mean difference between the pre test and post test mean values of Group A, B and C the significant differences noted in the Group sC in all three groups using Berg balance scale, Dizziness handicap inventory and Clinical test of sensory integration.

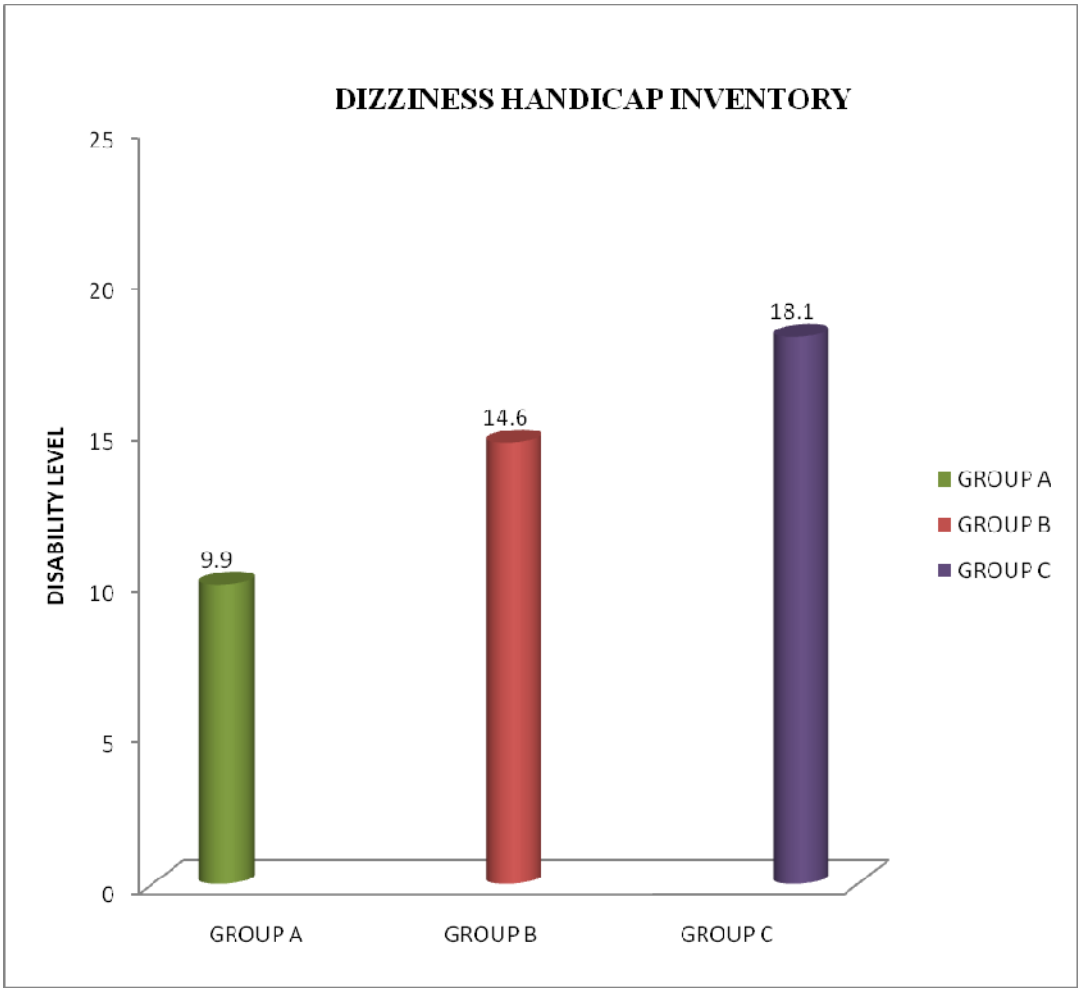
GRAPH- XIII

Graph on Analysis of Mean Difference between Pre Test and Post Test Means of Group A, B and C (BBS)



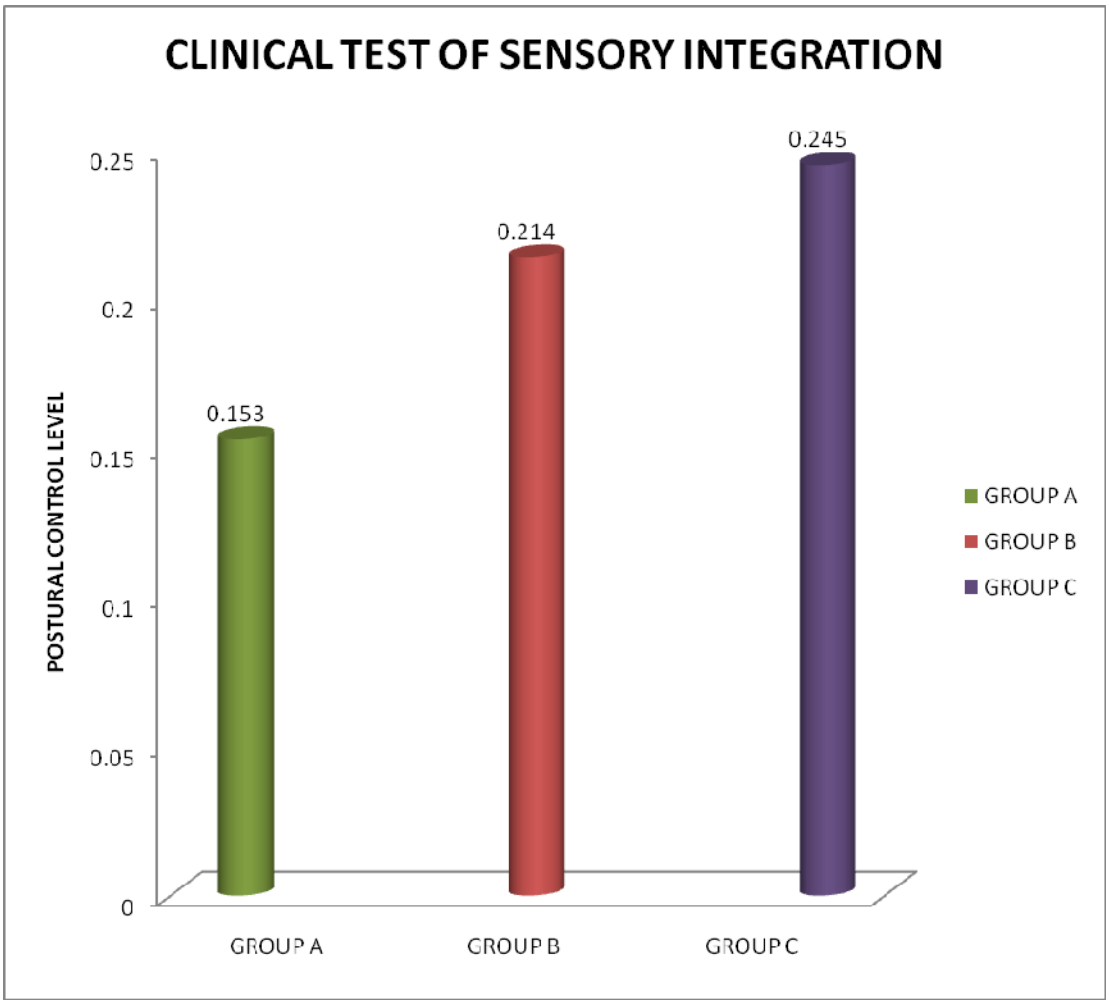
GRAPH -XIV

Graph on Analysis of Mean Difference between Pre Test and Post Test Means of Group A, B and C (DHI)



GRAPH- XV

Graph on Analysis of Mean Difference between Pre Test and Post Test Means of Group A, B and C (CTSI)



V. DISCUSSION

Vertigo is a false sensation of movement of either the body or the environment, usually described as spinning which suggests vestibular system dysfunction. The causative dysfunction can be located in the peripheral which account for about 35% to 55% or central vestibular which is less frequent. Vertigo is one of the 10 most common symptoms for which patients seek medical advice. It is an extremely complex disease, which affects the normal functional activities producing various symptoms which lead to disability (Nazareth et al, 1999).

Various treatments are available to reduce the symptoms, which include medicines and rehabilitative therapies. Vestibular rehabilitation exercises aim to facilitate rearrangement and recruitment of control capacities of the vestibular system. In addition to that, the vestibular system has a role in regulating respiratory muscle activity during movement and exercise (B.J.Yates, 2002). Thus the aim of the study was to assess the effect of cawthorne – Cooksey exercises along with the supplementary effect of breathing and proprioception exercises on balance, disability and postural control in vertigo patients.

The study was done in the outpatient physiotherapy department, K.G.Hospital, Coimbatore. 30 patients who were selected based on the selection criteria were divided into three groups by simple random sampling method after a detailed orientation. Patients in Group A were given Cawthorne and Cooksey

exercises alone, Group B subjects were given Cawthorne and Cooksey exercises along with breathing exercises and Group C subjects were given Cawthorne and Cooksey exercises along with breathing and proprioception exercises.

All three group subjects were undergone for pre-test assessment through Berg Balance Scale, Dizziness Handicapped Inventory and Clinical sensory Integration test. After pre-test assessment, all subjects from three groups were undergone for 8 weeks of treatment and then they were again involved for post test assessment through the same outcome scales.

The pre-test and post-test means of Group A, B and C were analysed using one-way ANOVA and the results showed that there is no significant differences between the pre-test means in Berg Balance score (F calculated : 0.4781, F critical : 3.3541), Dizziness Handicap Inventory score (F calculated : 1.546, F critical : 3.3541) and also in clinical test of sensory integration score (Fcalculated:2.0543,Fcritical: 3.3541). While analysing the post-test mean scores of Group A, B and C in Berg Balance score (F calculated: 13.84, F critical: 3.3541),DizzinessHandicap Inventory score(Fcalculated:29.679,Fcritical:3.3541) and clinical test of sensory integration score (Fcalculated:21.52, Fcritical:3.3541), it showed that there is significant difference in all three groups for all outcome measure results.

While using independent t-test for the analysis of post-test means of Group A and B in Berg Balance score it showed that the calculated value (1.8118) is greater than the one-tailed table value (1.734). Thus there is significant difference between Group A and B. While using independent t-test for the analysis of post-test means of Group B and C in Berg Balance score it showed that the calculated value (3.2851) is greater than the one-tailed table value (1.734).Thus there is significant difference between Group B and C. While using independent t-test for the analysis of post-test means of Group A and C in Berg Balance score it showed that the calculated value (4.8690) is greater than the one-tailed table value (1.734).Thus there is significant difference between Group A and C.

While using Dependent t-test for the analysis of pre-test and post-test mean scores in Berg Balance score it showed that there is significant differences in Group A (calculated value13.7 > table value 1.833) ,Group B (calculated value 14.9 > table value 1.833) and Group C (calculated value 13.3 > table value 1.833).

While using independent t-test for the analysis of post-test means of Group A and B in Dizziness Handicap Inventory score it showed that the calculated value (4.171) is greater than one-tailed table value (1.734).Thus there is significant difference between Group A and B. While using independent t-test for the analysis of post-test means of Group B and C in Dizziness Handicap

Inventory score it showed that the calculated value (3.6012) is greater than one-tailed table value (1.734).Thus there is significant difference between Group B and C. While using independent t-test for the analysis of post-test means of Group A and C in Dizziness Handicap Inventory score it showed that the calculated value (7.5761) is greater than one-tailed table value (1.734). Thus there is significant difference between Group A and C.

While using Dependent t-test for the analysis of pre-test and post-test mean scores in Dizziness Handicap Inventory score it showed that there is significant differences in Group A (calculated value 9.35 > table value1.833),Group B (calculated value 12.7 > table value 1.833) and Group C (calculated value 11.6 > table value 1.833).

While using independent t-test for the analysis of post-test means of Group A and B in clinical test of sensory integration score it showed that the calculated value (3.1590) is greater than one-tailed table value (1.734).Thus there is significant difference between Group A and B. While using independent t-test for the analysis of post-test means of Group B and C in clinical test of sensory integration score it showed that the calculated value (3.7713) is greater than one-tailed table value (1.734).Thus there is significant difference between Group B and C. While using independent t-test for the analysis of post-test means of Group A and C in clinical test of sensory integration in score it showed

that the calculated value (6.1372) is greater than one-tailed table value (1.734). Thus there is significant difference between Group A and C.

While using Dependent t-test for the analysis of pre-test and post-test mean scores in clinical test of sensory integration score it showed that there is significant differences in Group A (calculated value 9.03 > table value 1.833), Group B (calculated value 12.3 > table value 1.833) and Group C (calculated value 23.4 > table value 1.833).

While observing the mean difference scores for Berg Balance scale in Group A, Group B and Group C it has given the scores as 11.4, 12.4 and 18 respectively. Likewise, the mean difference score for Dizziness Handicap Inventory in Group A, Group B and Group C were as 9.9,14.6 and 18.1 respectively and the mean difference scores of Group A, B and C for clinical test of sensory integration were also as 0.15,0.21 and 0.24 respectively.

It showed that there is significant difference in functional balance, disability level and postural control in all three groups but there is a marked improvement in functional balance, reduced disability and postural control in Group C who were undergone to cawthorne-Cooksey exercise along with breathing and proprioception exercises than the patients in Group A and B.

The findings of this study were supported by the findings of Katherine Jauregui et al, 2007. Hence breathing and proprioception exercises along with cawthorne – Cooksey exercises can be utilized for the improvement of functional balance, postural control and reducing the disability in patients with chronic vertigo patients.

B.J Yates et al (2002) described that vestibular system has the role in regulating the respiratory muscle activity during movement and M.K.Sharpe et al (2002) stated the influence of vestibular activation on respiration in humans. Moreover Bright et al stated that vestibular rehabilitation proved as an effective and beneficial intervention for the treatment of vertigo symptoms. This study has also proved that there is significant improvement following Cawthorne-Cooksey exercise along with breathing and proprioception exercises on functional balance, reduced disability and postural control in vertigo patients.

VI .CONCLUSION

There is a significant effect on functional balance, disability and postural control following Cawthorne-Cooksey Exercises alone (Group A subjects), Cawthorne-Cooksey exercises along with breathing exercises (Group B subjects) and Cawthorne-Cooksey exercises along with breathing exercises and proprioception exercises (Group C subjects) in vertigo patients. Although there is improvement in Group A and Group B subjects, the improvement of Group C subjects on functional balance, disability and postural control is superior to the other two groups. Thus, this study concludes that there is a marked improvement on functional balance, disability and postural control following cawthorne – Cooksey exercises along with breathing exercises and proprioception exercises. Hence this study has explored the supplementary effects of breathing and proprioception exercises along with cawthorne – Cooksey exercises in vertigo population and these exercises can be added to the regular interventions for vestibular rehabilitation.

VII. LIMITATIONS AND RECOMMENDATIONS

- The study is of short duration
- The study was done on small sample size
- Certain metabolic or orthopaedic disease patient, smokers have not been taken into considerations
- The study has not been for patients with benign paroxysmal positional vertigo or Meniere's disease and therefore may not be possible to generalise the study for all vertigo patients
- The future study is needed to evaluate the length of different exercise programs on various outcome measures in vertigo patients
- The studies are needed to evaluate the psychological effects of training the breathing at a usual frequency on patient with chronic vestibular disease
- This study does not evaluate the anxiety disorders which are the most common mental disorders in general adult population
- The longer duration study is needed to conclusively validate the results. It also can be done on larger population

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IX. APPENDIX

APPENDIX-I

NEUROLOGICAL EVALUATION CHART

SUBJECTIVE ASSESSMENT

Name :

Age :

Sex :

Occupation :

Handedness :

Date of assessment :

Date of admission :

Chief complaints :

Present medical history (condition, drug, surgery….)

Past medical history (condition, drug, surgery….)

Personal history :

Occupational history :

Family history :

Socioeconomic status :

Environmental history :

Risk factors :

Associated problems :

Pain history :

- Side
- Site
- Onset
- Duration
- Quality
- Intensity
- Aggravating factors
- Relieving factors

Vital signs :

- Temperature
- Pulse rate
- Respiratory rate
- BP

OBJECTIVE ASSESSMENT :

ON OBSERVATION

- Built
- Posture
- Attitude of limbs
- Muscle wasting
- Oedema
- Involuntary movements
- Tropical changes

- Deformities
- Gait
- Pressure sores
- Respiration
- External appliances

ON PALPATION:

- Oedema
- Tenderness
- Warmth

ON EXAMINATION:

Higher mental function :

- Consciousness
- Orientation
- Attention
- Memory
- Communication
- Emotional status

Higher cortical function :

Cognition

Perception

Mental status assessment :

- Affect
- Mood
- Behaviour

- Speech
- Thought process
- Thought content

Speech :

- Sound production
- Articulation
- Understanding & expressing words

Hearing :

Vision :

Cranial nerves examination :

Vestibulo cochlear :

Cochlear part :

- Conductive /sensory neural

Vestibular part:

- Gait
- Nystagmus
- Hall pike's test

Other cranial nerves

Sensory system :

- Superficial sensation
- Deep sensation
- Cortical sensation

Motor system :

- Muscle tone
- Muscle girth
- Functional Range of Motion

Reflexes

- Superficial reflexes
- Deep reflexes
- Pathological reflexes

Voluntary movements :

Involuntary movements :

- Type
- Aggravating factors
- Limiting factors
- Quality

Balance :

- Static balance
- Dynamic balance
- Balance reactions

Posture :

- Lying
- Sitting
- Standing

Gait :

Hand functions :

Other systems :

Musculoskeletal system

- Fracture
- Muscle contracture
- Joint stiffness
- Joint subluxation
- Osteoporosis
- Limb length discrepancy

- **Integumentary system**
- **Autonomic nervous system**
- **Bladder function**
- **Bowel function**
- **Functional Assessment**
    - ADL
    - Functional status

Diagnosis

Problem list

Short term & long term goals

Means

APPENDIX-II

BERG BALANCE SCALE

The Berg Balance Scale (BBS) was developed to measure balance among older people with impairment in balance function by assessing the performance of functional tasks. It is a valid instrument used for evaluation of the effectiveness of interventions and for quantitative descriptions of function in clinical practice and research. The BBS has been evaluated in several reliability studies. A recent study of the BBS, which was completed in Finland, indicates that a change of eight (8) BBS points is required to reveal a genuine change in function between two assessments among older people who are dependent in ADL and living in residential care facilities.

Description:

14-item scale designed to measure balance of the older adult in a clinical setting.

Equipment needed: Ruler, two standard chairs (one with arm rests, one without), footstool or step, stopwatch or wristwatch, 15 ft walkway

Completion:

Time: 15-20 minutes

Scoring: A five-point scale, ranging from 0-4. "0" indicates the lowest level Of function and "4" the highest level of function. Total Score = 56

Interpretation: 41-56 = low fall risk

21-40 = medium fall risk

0 –20 = high fall risk

A change of 8 points is required to reveal a genuine change in function between 2 assessments.

Berg Balance Scale

Name: _____ Date:

Location: _____ Rater: _____

ITEM DESCRIPTION SCORE (0-4)

Sitting to standing _____

Standing unsupported _____

Sitting unsupported _____

Standing to sitting _____

Transfers _____

Standing with eyes closed _____

Standing with feet together _____

Reaching forward with outstretched arm _____

Retrieving object from floor _____

Turning to look behind _____

Turning 360 degrees _____

Placing alternate foot on stool _____

Standing with one foot in front _____

Standing on one foot _____

Total _____

GENERAL INSTRUCTIONS

Document each task and/or give instructions as written. When scoring, please record the lowest response category that applies for each item. In most items, the subject is asked to maintain a given position for a specific time. Progressively more points are deducted if:

- the time or distance requirements are not met
- the subject's performance warrants supervision
- the subject touches an external support or receives assistance from the examiner.

Subject should understand that they must maintain their balance while attempting the tasks. The choices of which leg to stand on or how far to reach are left to the subject. Poor judgment will adversely influence the performance

and the scoring. Equipment required for testing is a stopwatch or watch with a second hand, and a ruler or other Indicator of 2, 5, and 10 inches. Chairs used during testing should be a reasonable height. Either a step or a stool of average step height may be used for item # 12.

Berg Balance Scale

SITTING TO STANDING

INSTRUCTIONS: Please stand up. Try not to use your hand for support.

( ) 4 able to stand without using hands and stabilize independently

( ) 3 able to stand independently using hands

( ) 2 able to stand using hands after several tries

( ) 1 needs minimal aid to stand or stabilize

( ) 0 needs moderate or maximal assist to stand

STANDING UNSUPPORTED

INSTRUCTIONS: Please stand for two minutes without holding on.

( ) 4 able to stand safely for 2 minutes

( ) 3 able to stand 2 minutes with supervision

( ) 2 able to stand 30 seconds unsupported

( ) 1 needs several tries to stand 30 seconds unsupported

( ) 0 unable to stand 30 seconds unsupported

If a subject is able to stand 2 minutes unsupported, score full points for sitting unsupported. Proceed to item #4.

SITTING WITH BACK UNSUPPORTED BUT FEET SUPPORTED ON FLOOR OR ON A STOOL

INSTRUCTIONS: Please sit with arms folded for 2 minutes.

( ) 4 able to sit safely and securely for 2 minutes

( ) 3 able to sit 2 minutes under supervision

( ) 2 able to able to sit 30 seconds

( ) 1 able to sit 10 seconds

( ) 0 unable to sit without support 10 seconds

STANDING TO SITTING

INSTRUCTIONS: Please sit down.

( ) 4 sits safely with minimal use of hands

( ) 3 controls descent by using hands

( ) 2 uses back of legs against chair to control descent

( ) 1 sits independently but has uncontrolled descent

( ) 0 needs assist to sit

TRANSFERS

INSTRUCTIONS: Arrange chair(s) for pivot transfer. Ask subject to transfer one way toward a seat with armrests and one way toward a seat without armrests. You may use two chairs (one with and one without armrests) or a bed and a chair.

( ) 4 able to transfer safely with minor use of hands

( ) 3 able to transfer safely definite need of hands

( ) 2 able to transfer with verbal cuing and/or supervision

( ) 1 needs one person to assist

( ) 0 needs two people to assist or supervise to be safe

STANDING UNSUPPORTED WITH EYES CLOSED

INSTRUCTIONS: Please close your eyes and stand still for 10 seconds.

( ) 4 able to stand 10 seconds safely

( ) 3 able to stand 10 seconds with supervision

( ) 2 able to stand 3 seconds

( ) 1 unable to keep eyes closed 3 seconds but stays safely

( ) 0 needs help to keep from falling

STANDING UNSUPPORTED WITH FEET TOGETHER

INSTRUCTIONS: Place your feet together and stand without holding on.

( ) 4 able to place feet together independently and stand 1 minute safely

( ) 3 able to place feet together independently and stand 1 minute with supervision

( ) 2 able to place feet together independently but unable to hold for 30 seconds

( ) 1 needs help to attain position but able to stand 15 seconds feet together

( ) 0 needs help to attain position and unable to hold for 15 seconds

Berg Balance Scale continued…

REACHING FORWARD WITH OUTSTRETCHED ARM WHILE STANDING

INSTRUCTIONS: Lift arm to 90 degrees. Stretch out your fingers and reach forward as far as you can. (Examiner places a ruler at the end of fingertips when arm is at 90 degrees. Fingers should not touch the ruler while reaching forward. The recorded measure is the distance forward that the fingers reach while the subject is in the most forward lean position. When possible, ask subject to use both arms when reaching to avoid rotation of the trunk.)

( ) 4 can reach forward confidently 25 cm (10 inches)

( ) 3 can reach forward 12 cm (5 inches)

( ) 2 can reach forward 5 cm (2 inches)

( ) 1 reaches forward but needs supervision

( ) 0 loses balance while trying/requires external support

PICK UP OBJECT FROM THE FLOOR FROM A STANDING POSITION

INSTRUCTIONS: Pick up the shoe/slipper, which is in front of your feet.

( ) 4 able to pick up slipper safely and easily

( ) 3 able to pick up slipper but needs supervision

( ) 2 unable to pick up but reaches 2-5 cm(1-2 inches) from slipper and keeps balance independently

( ) 1 unable to pick up and needs supervision while trying

( ) 0 unable to try/needs assist to keep from losing balance or falling

TURNING TO LOOK BEHIND OVER LEFT AND RIGHT SHOULDERS WHILE STANDING

INSTRUCTIONS: Turn to look directly behind you over toward the left shoulder. Repeat to the right. (Examiner may pick an object

to look at directly behind the subject to encourage a better twist turn.)

( ) 4 looks behind from both sides and weight shifts well

( ) 3 looks behind one side only other side shows less weight shift

( ) 2 turn sideways only but maintain balance

( ) 1 needs supervision when turning

( ) 0 needs assist to keep from losing balance or falling

TURN 360 DEGREES

INSTRUCTIONS: Turn completely around in a full circle. Pause. Then turn a full circle in the other direction.

( ) 4 able to turn 360 degrees safely in 4 seconds or less

( ) 3 able to turn 360 degrees safely one side only 4 seconds or less

( ) 2 able to turn 360 degrees safely but slowly

( ) 1 needs close supervision or verbal cuing

( ) 0 needs assistance while turning

PLACE ALTERNATE FOOT ON STEP OR STOOL WHILE STANDING UNSUPPORTED

INSTRUCTIONS: Place each foot alternately on the step/stool. Continue until each foot has touched the step/stool four times.

( ) 4 able to stand independently and safely and complete 8 steps in 20 seconds

( ) 3 able to stand independently and complete 8 steps in > 20 seconds

( ) 2 able to complete 4 steps without aid with supervision

( ) 1 able to complete > 2 steps needs minimal assist

( ) 0 needs assistance to keep from falling/unable to try

STANDING UNSUPPORTED ONE FOOT IN FRONT

INSTRUCTIONS: (DEMONSTRATE TO SUBJECT) Place one foot directly in front of the other. If you feel that you cannot place your foot directly in front, try to step far enough ahead that the heel of your forward foot is ahead of the toes of the other foot. (To score 3 points, the length of the step should exceed the

length of the other foot and the width of the stance should approximate the subject's normal stride width.)

( ) 4 able to place foot tandem independently and hold 30 seconds

( ) 3 able to place foot ahead independently and hold 30 seconds

( ) 2 able to take small step independently and hold 30 seconds

( ) 1 needs help to step but can hold 15 seconds

( ) 0 loses balance while stepping or standing

STANDING ON ONE LEG

INSTRUCTIONS: Stand on one leg as long as you can without holding on.

( ) 4 able to lift leg independently and hold > 10 seconds

( ) 3 able to lift leg independently and hold 5-10 seconds

( ) 2 able to lift leg independently and hold L 3 seconds

( ) 1 tries to lift leg unable to hold 3 seconds but remains standing independently.

( ) 0 unable to try of needs assist to prevent fall

( ) TOTAL SCORE (Maximum = 56)

APPENDIX-III

DIZZINESS HANDICAP INVENTORY

	YES	SOMETIMES	NO
P1.Does looking up increases your problem?			
E2.Because of your problem, do you feel frustrated?			
F3. Because of your problem, do you restrict your travel for business or recreation?			
P4.Does walking down the aisle of a super market increases your problem?			
F5. Because of your problem, do you have difficulty getting into or out of bed?			
F6. Does your problem significantly restrict your participation in social activities, such as going out to dinner, going to the movies, dancing, or going to parties?			
F7.Because of your problem, do you have difficulty reading?			
P8.Does performing more ambitious activities such as sports, dancing, household chores increases your problem?			
E9. Because of your problem, are you afraid to leave your home without having someone accompany you?			
E10. Because of your problem have you been embarrassed in front of others?			
P11.Do quick movements of your head increase your problem?			
F12. Because of your problem, do you avoid heights?			
P13.Does turning over in bed increases your problem?			
F14. Because of your problem, is it difficult for you to do strenuous homework or yard work?			
E15. Because of your problem, are you afraid people may think you are intoxicated?			
F16.Because of your problem, is it difficult for you to go for a walk by yourself?			
P17.Does walking down a sidewalk increases your problem?			

E18. Because of your problem, is it difficult for you to concentrate?			
F19. Because of your problem, is it difficult for you to walk around your house in the dark?			
E20. Because of your problem, are you afraid to stay home alone?			
E21. Because of your problem, do you feel handicapped?			
E22.Has the problem placed stress on your relationships with members of your family?			
E23. Because of your problem, are you depressed?			
F24.Does your problem interfere with your job or household activities?			
P25.Does bending over increases your problem?			

DHI SCORING INSTRUCTIONS

The patient is asked to answer each question as it pertains to dizziness or unsteadiness problems, specifically considering their condition during the last month. Questions are designed to incorporate functional (F), physical (P), and emotional (E) impacts on disability.

To each item, the following scores can be assigned:

No=0 Sometimes=2 Yes=4

Scores:

Scores greater than 10 points should be referred to balance specialists for further evaluation.

16-34 Points (mild handicap)

36-52 Points (moderate handicap)

54+ Points (severe handicap)

APPENDIX –IV

MODIFIED CLINICAL TEST OF SENSORY INTEGRATION

It is used for preliminary assessment of how well a patient can integrate various senses with respect to balance and compensate when one or more of those senses are compromised.

Sensory system involvement is modulated within various conditions as follows:

Condition 1: Eyes open, firm surface

Condition 2: Eyes closed, firm surface

Condition 3: Eyes open, foam surface

Condition 4: Eyes closed, foam surface

Equipment: Foam pad and a stop watch

Starting position: Patients stands with feet shoulder width apart and arms crossed over chest.

Protocol: A 30 – second trial is timed using a stopwatch. Time is stopped during a trial and recorded if a) patient deviates from initial crossed arm position, b) patients open eyes during an eyes closed trial condition, c) patients moves feet or required manual assistance to prevent loss of balance. A trial is successful if the patient is capable of maintaining the starting position independently for a period of 30 seconds.

A maximum of three trials are performed for all conditions. Trials are performed until the patient either a) successfully maintains the starting position for an entire 30 seconds or b) complete three 30 seconds trials to the best of their ability.

Scoring:

Conditions 1 through 4: Record the time (in seconds) the patient was able to maintain the starting position (maximum of 30 seconds). Remember to record the times for all trials.

Total score =Average time condition 1(if >1 trial required) +

Average time condition 2(if >1 trial required) +

Average time condition 3 (if>1 trial required) +

Average time condition 4(if >1 trial required).

APPENDIX – V

CAWTHORNE COOKSEY EXERCISES

1. In bed or sitting

    1. Eye movements – at first slow, then quickly
        1. up and down
        2. from side to side
        3. focusing on finger moving from 3 feet to 1 foot away from face
    2. Head movements at first slow, and then quick, later with eyes closed
        1. bending forward and backward
        2. turning from side to side

2. Sitting

    1. Eye movements and head movements as above
    2. Shoulder shrugging and circling
    3. Bending forward and picking up objects from the ground

3. Standing

    1. Eye, head and shoulder movements as before
    2. Changing form sitting to standing position with eyes open and shut
    3. Throwing a small ball from hand to hand (above eye level)
    4. Throwing a ball from hand to hand under knee
    5. Changing from sitting to standing and turning around in between

4. Moving about

    1. Circle around centre person who will throw a large ball and to whom it will be returned
    2. Walk across room with eyes open and then closed

3. Walk up and down slope with eyes open and then closed
4. Walk up and down steps with eyes open and then closed
5. Bowling

   The exercises are carried out for at least 10 minutes, twice a day for Period of 8 weeks

BREATHING EXERCISES

- Deep diaphragmatic exercises are performed at the paced Breathing pattern 12 breaths per minute
- They were asked to practice ½ an hour twice a day for eight weeks and practiced while seated and changing posture.

PROPRIOCEPTION EXERCISES

The exercises included are:

1) To walk slowly (bare feet) in a corridor at least 4m long, while focusing on the movement and sensation of each foot, 5 min, at first in day light and when tolerated in dim light

2) To shift the body weight on each leg, while standing beside a wall, focussing on the effort and the position of the joints, 5 seconds on each leg at least 10 times.

3) Single leg balance on a stable surface, gradually lifting the opposite leg in semi-flexion, focusing on the effort and movement, at least 10 times on each leg.

APPENDIX- VI

CONSENT FORM

This is to certify that I _____ freely and voluntarily agree to participate in the study **"Effect of Cawthorne-Cooksey Exercises Along With Breathing and Proprioception Exercises on Balance, Disability and Postural Control in Vertigo Patients".**

I have been explained about the procedures and the risks that would occur during the study.

Participant:

Witness:

Date:

I have explained and defined the procedure to which the subject has consented to participate.

Researcher:

Date: